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ABSTRACT

This manual was developed by the Community Resource Curriculum Development Project (CRCDP), a cooperative project to develop multi-disciplinary, multi-ethnic, multi-cultural science/social sciences teaching units based upon the Illinois State Goals for Learning and the Chicago Public Schools outcomes for a seamless kindergarten, first, and second grade cluster. This manual contains six teaching units that include several experience-based activities using a constructivist teaching model and incorporating local resources. In these units, students approach each activity using skills gained from their own life experiences. Scientific principles and concepts are introduced following active exploration with hands-on models and investigations. Lessons are linked to information available in the local area and teachers are encouraged to utilize resources in their neighborhood communities whenever possible. The units include: (1) "Eco Eco..."; (2) "The Four Seasons of the Year"; (3) "Getting a Grip on our Garbage"; (4) "Animals, Animals Everywhere: Land, Sea, and Air"; (5) "Our Wonderful Raintree Forests"; and (6) "Developing an Appreciation for Trees." (JRH)

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Resource

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**Grades
K-2**

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A Cooperative Effort Project

between

**William H. Brown Elementary School
Galileo Scholastic Academy
Andrew Jackson Language Academy
Mark T. Skinner Elementary
National-Louis University
University of Illinois/Chicago
and
The Chicago Academy of Sciences**

Spring, 1994

Project Partners

Andrew Jackson Language Academy
Galileo Scholastic Academy of Math and Science
Mark T. Skinner Elementary School
William H. Brown Elementary School
National-Louis University
The Chicago Academy of Sciences
University of Illinois/Chicago

Community Resource Curriculum Development Project (CRCDP)

The CRCDP is a cooperative project to develop multi-disciplinary, multi-ethnic, multi-cultural science/social sciences teaching units based upon the Illinois State Goals for Learning and Chicago Public School outcomes for a seamless Kindergarten, first, and second grade cluster. The project provided a team of teachers and principals with a learning experience in creating curriculum resulting in these six teaching units. The units include several experienced-based activities, using a constructivist teaching model and incorporating local resources.

Teachers have their own individual styles and techniques of instruction. Students have their own individual experiences, understanding, and ways of processing and internalizing what they are to learn. Recognizing these differences in instruction and learning, CRCDP presents flexible yet effective lessons designed to help maximize the success of both teachers and students in their science/social sciences classes.

CRCDP is based on the belief that real learning happens more easily and thoroughly within the context of real life. In these units, students approach each activity using skills gained from their own life experiences. Scientific principles and concepts are introduced following active exploration with hands-on models and investigations. CRCDP provides a bridge between the abstractions of the school curriculum and the world (see Forward, page 1).

The CRCDP learning model also focuses on the use of real, experience-based activities in the classroom. Lessons are linked to information available in the local area and teachers are encouraged to utilize resources in their neighborhood communities whenever possible (see Community Resources, page 13).

The CRCDP project and materials have been funded through an Eisenhower grant. The writing teams created six different units. Copies of the units are available through The Chicago Academy of Sciences. Call 312/549-0606, Ext. 2047 for more information.

CRCDP Objectives

CRCDP units stand alone and are designed to provide ways to individualize existing science/social science instruction to help meet the many needs of the students. The multi-disciplinary nature of the program maximizes the impact of learning skills and the indicated outcomes. The specific objectives of the projects are:

1. to develop a network of resource agencies which can offer expertise, programs, and personnel to aid in the implementation of the State of Illinois Learning Goals;
2. to empower the local school communities by providing meaningful, hands-on knowledge in curriculum development, implementation, and evaluation to teachers and administrators at the local level; and
3. to provide an easily accessible directory of resources and curriculum units to aid the urban classroom teacher in teaching, and to give the academic direction and materials necessary to fulfill Illinois State Goals for Learning requirements at the Kindergarten, first, and second grade level.

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Forward

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As the 21st century approaches, new developments in science education will have far-ranging influences in both the science content in the curriculum and in the way science is taught. At the national level, new standards for science teaching and learning are being drawn up by the National Committee on Science Education Standards and Assessment, under the auspices of the National Research Council (NRC). The Standards, akin to the NCTM Standards in Mathematics, are intended to describe how content, teaching, and assessment are coordinated in classroom practice so that all students have an opportunity to learn science (NRC, 1993, p.10). The Standards follow in the footsteps of two influential national projects, Project 2061 of the American Association for the Advancement of Science (AAAS) and the Project Scope & Sequence of the National Science Teachers Association (NSTA) (Rutherford & Ahlgren, 1990; NSTA, 1990). These documents point the way in curriculum and instruction in science for practitioners at all levels.

Many school systems across the country are in the process of revising their curricula to be in tune with the recommendations of these documents. A group of teachers and administrators from four elementary schools in the Chicago Public Schools became engaged in collaboratively pursuing this course in 1993 as part of the Community Resource Curriculum Development Project (CRCDP), funded by the Illinois Board of Higher Education through the Dwight D. Eisenhower Program. In this project, educators from the schools involved-- William H. Brown Elementary, Galileo Scholastic Academy, Andrew Jackson Language Academy, and Mark T. Skinner Elementary-- worked to create integrated science and social sciences units, with assistance of a team of consultants which included this writer, Dr. Janice Schnobrich, former teacher at Skinner Elementary, Carol Fialkowski, Phil Parfitt and Ken Rose from the Chicago Academy of Sciences, Dr. Albert Larson of the University of Illinois, and Mary Nalbandian, former Director of Science for the Chicago Public Schools.

Such curriculum work at the local school level is needed now, as the Chicago Public School system no longer has a curriculum department. With the decentralization of the Chicago School District, the responsibility for curriculum development has fallen to the schools even though there was no provision for local professional education regarding this complex task. The major aim of the Community Resource Curriculum Development Project was to facilitate the professional development of these schools' professional staff in the area of curriculum writing.

To promote the objectives of this project, teams of two or three teachers and administrators, with diverse experience, worked on creating an integrated science-social sciences instructional unit. During the first year of the Eisenhower grant support, seven science-social sciences units were completed by the teams, each focused on one or more community resources, including Chicago's cultural institutions. The units were conceived in terms of the mandated Illinois State Goals for Learning for the kindergarten through six grade levels, and in terms of contemporary scholarship on teaching and learning. They include assessment, particularly alternate ways to measure student growth, such as through portfolios, projects and/or other performance measures. Each team wrote one unit, utilizing the Chicago Public School's *Objectives and Standards* and the state science and social sciences goals.

The unit writing workshop sessions offered by the CRCDP considered current scholarship in both the disciplines and in pedagogy. Most of the new national science programs are now being influenced to various degrees by an emerging understanding of the way children learn science (Shamos, 1989). The view now is that success in learning requires the student's engagement and effort. It also requires his or her attention to central ideas, the "conceptual themes" of science. Learning is seen to be a complex phenomena involving various learning styles. Nevertheless, what is learned is always a construction (Sigel, 1978). Because engagement with the content is so important, the affective domain, that is, the child's *attitude* and *interest*, is of foremost importance for learning success. Because connections are required between new and previous knowledge, the amount and quality of the child's *reflecting* also is important. Because knowledge realms ultimately connect and because discipline bound fragmentation can be narrow-mindedness, emphasis now is placed upon teaching science across the curriculum, on integrating instruction.

The whole language movement in the language arts and reading also emphasizes more integration.

Academics call the theory which now informs much work in science education "constructivism". The idea that we build or *construct* our meanings is the source of the label. It is a view still unfamiliar to many educators. To scholars, constructivism is an *epistemology*, a theory of knowledge, an explanation of how we as individuals, or as communities of individuals (the scientists), know what we know about the world.

Learning

Instead of being passive recipients of data from the outside, the child's memory and meaning are *constructions*, concepts which are influenced by prior knowledge and other factors. Incoming stimuli are processed by the child using beliefs, concepts, frameworks, which were created earlier. As the child solves problems, interacts with others, and adapts to circumstances in life, concepts-- models of the world and how it works-- are added and developed.

A child's prior knowledge about a natural phenomena influences his or her science learning (Ausubel, 1968). As Michael Watts (1991) puts it, "We come to understand things in terms of what we already understand; if we cannot lock new ideas into the ideas we have already generated, then new experiences become somewhat meaningless" (p. 54). In learning science, prior knowledge has been demonstrated to be powerfully facilitative or, the opposite, obstructive (Osborne & Freyberg, 1985; Driver, 1983; Watts, 1991). The science education literature is full of studies of children's naive science, their alternative conceptions (not *misconceptions*, because no conception can be proven to replicate physical reality). From this work we can say that some of a child's prior conceptions are common among children of particular developmental levels, while others are idiosyncratic. Naive conceptions often are robust and resistant to change through construction, others are amenable to change (Conner, 1990; Watts, 1991).

For the child, as well as for us all, coming to understand something is a creative act. *Active participation* is a must (Watts, 1991). The various conceptual worlds represent, or model, the physical world (the 'real' world) and are always *interpretations* of some text, a written text or a text of nature. The constructions we

make help us interpret experience (Kelly, 1955). Our models, like those of scientists, change in response to everyday 'reality testing' and may be replaced by those which work better.

Not all concepts function at the same level. Our conceptual worlds are organized in an hierarchy: some concepts overarch others, some ideas provide a framework for others. Particular ideas are key to understanding others. For example, Newton's concept of force is critical to understanding his mechanics (Hestenes, Wells, & Swackhamer, 1992).

As the child constructs his or her conceptual world, initial understandings often may be fragmentary and incoherent (diSessa, 1988). Conceptual coherence can develop in big jumps, as insight. A conceptual world can become completely reorganized after a particular insight or upon the resolution of a conflict. The key processes which lead to concept development are *reflection* and *problem solving*. Cognitive change includes aspects of *restructuring*, *invention*, and *directionality*. The child may *appropriate* the adult meaning (Newman, Griffin, and Cole, 1989).

Constructivism as a theory of knowing can be summarized in the following principles:

- Knowledge consists of past constructions-- the world is known through a framework that transforms, organizes, and interprets one's perceptions;
- Constructions develop through the processes of assimilation and accommodation, by which old concepts are adapted and altered to fit a logical framework;
- Learning is more an organic process of invention than a process of accumulation-- learning involves different frameworks of understanding which one produces in structural leaps in cognition made throughout development;
- Meaningful learning occurs through reflection and resolution of cognitive conflict, and this process brings coherence to earlier fragmented and incomplete understanding (Fosnot, 1989, 19-20; see also von Glasersfeld, 1989; Vygotsky, 1978; Howe & Jones, 1993).

The primary goals of science instruction should be, first, to encourage the child's willingness to learn ("feeling is first" as e.e. cummings said), and second, to facilitate *understanding* of the scientific concepts and models. The child should be enabled by

instruction to construct facsimiles of scientists' ideas. The child should see that, at least in some circumstances, the scientists' view is better than his or her naive explanation, that is, more useful, or plausible, or intelligible (Abimbola, 1983). Teaching science involves *persuasion*. For change to occur, a student needs to become dissatisfied with the commonsense beliefs about the world and perceive scientific explanations as worthwhile. The child's prior knowledge provides the necessary bridge for understanding, but also can be an obstacle. Thus, for the teacher, "...effective instruction requires more than dedication and subject knowledge. It requires technical knowledge about how students think and learn" (Hestenes, Wells, & Swackhamer, 1992, p. 142).

Teaching for Conceptual Change

There is no recipe for constructivist science teaching, but the central goals are encouraging willingness to learn and facilitating understanding. For many students today, science lessons are characterized mostly by teacher talk and student note taking, with major emphasis on memorization, and often including meaningless activities and investigations. Science typically is isolated in the curriculum. Among both children and adults, scientific ideas are widely misunderstood, and student interest in science declines through the grades (Miller, 1989, Biddulph & Osborne, 1984). Even hands-on activities will not automatically lead to conceptual development-- significant teacher facilitation is almost always required.

The challenge for teachers is not so much in understanding the constructivist theory of learning, "...it is in discerning and acting on the teaching implications.. The challenge for teachers is helping children to ask the right questions, so that they examine their ideas, their observations, their findings, and develop more valid scientific understandings. It is about deepening and clarifying children's insights." (Smythe, 1993, 8). An old Deweyan ideal, child-centered teaching, now is back in fashion.

Teachers are likely to find useful a variety of strategies to foster concept learning. Examples of such strategies include the following:

1. Focus on significant representations (models, images, concept webs, maps, etc.);
2. Persuade students of the value of the scientific models;

3. Link instruction to students' past experiences and earlier lessons;
4. Use predictions and explanations to elicit students' prior knowledge;
5. Provide opportunities for students to test predictions, discover contradictory evidence, and consider alternate explanations;
6. Encourage several modes of representation-- writing, speaking, drawing, acting, etc.;
7. Summarize students' experiences, highlight and contrast alternative concepts, ask for evidence for different views, and discuss applications in children's lives (Neale, Smith, and Johnson 1990, p. 112).

Many other teaching methods are congenial to a constructivist stance. Brooks (1990) would add that the kind of strategies that are implied in constructivist theory would have teachers foster student autonomy, initiative, and leadership; use manipulative, interactive, and physical materials; use raw data and primary sources; allow student thinking to drive lessons (that is, teachers should alter content based on student responses). Brooks also suggests that teachers should cluster lessons around problems, questions, and situations regarding similar concepts, and that teachers should inquire about their students' concepts before they share their own.

Jay Lemke and those who follow Vygotsky encourage teachers to facilitate dialogue among students (Lemke, 1990; Newman, Griffin, & Cole, 1989). This can be done in a variety of ways, such as by asking open-ended questions and by posing contradictions to students' views then inviting responses. These teacher behaviors promote inquiry.

One of the more obvious and significant implications of constructivism is that teachers should encourage students to reflect on the content. Many strategies promote reflection, including allowing wait-time after posing questions and seeking elaboration of students' responses. Teachers have to be sensitive to the pace of instruction because if more student reflection is a priority, time will be required for the discovery of relationships and the creation of metaphors (Brooks, 1990).

Most fundamentally, constructivist methods are about getting children to *think*. Constructing/restructuring concepts is an effortful practice that is accomplished

through reflective thought. To learn the scientists' views, children have to think about them (and that is why student motivation is so central a concern).

Constructivism as a View of the Nature of Science

Conceptual change is a phenomenon of individual growth and development, but conceptual change also occurs in cultural communities, like the communities of scientists. Constructivism is a theory, therefore, of the growth of knowledge in science. Science "...is a process that assists us to make sense of our world." (Lorsbach & Tobin, 1992, pp. 1-2).

Scientific knowledge is a complex of meanings continually negotiated in a community of workers. As Einstein himself states:

Science is not just a collection of laws, a catalogue of unrelated facts. It is a creation of the human mind, with its freely invented ideas and concepts. Physical theories try to form a picture of reality and to establish its connection with the wide world of sense impressions (Einstein & Enfield, 1938, p. iii).

The other aspect of the typical definition of science is that it is a process of knowing. In many classrooms this process is still being communicated as "the scientific method," which is often described as a stepwise procedure of experimentation, beginning with either a question or a hypothesis and ending with a conclusion, the new knowledge. Students are taught Dewey's steps but without the context within which Dewey was speaking. Duschl (1988) calls this distortion of the nature of sciences *scientism*, which also includes the notion that there is a single right solution to every problem. We know now, however, that scientists don't follow any such steps in carrying out their work (although they often report their work in a format that reflects a stepwise procedure). What can be said with certainty about the scientific method is that scientists' work is *creative*. From a constructivist perspective, "the scientific method", if one is to be identified, is to create valid models of nature:

The great game of science is modeling the real world, and each scientific theory lays down a system of rules for playing the game. The object of the game is to construct valid models of real objects and processes. Such models comprise the core of scientific knowledge. To understand science is to know how scientific models are constructed and validated. The main objective of

science instruction should therefore be to teach the modeling game (Hestenes, 1992, p. 732).

Constructivism has provided much insight into the nature of science, including its scope and limits. The latest view of science, however, is complex and challenging, and many issues remain unresolved. Nevertheless, implications for science teaching can be derived from constructivist philosophy of science (Duschl, 1990; Duschl & Hamilton, 1992).

One implication is that science activities in the classroom should be less like cookbook recipes. Student activities typically provided in textbooks follow a common pattern. First a problem is stated or a question asked. Then follow aims or objectives, then a list of materials and the procedures. At the end are questions about the results which guide students to the "right" conclusions. The "hidden" lesson is that correct conclusions are reached by this procedure (inductive reasoning) (Garrison and Bentley, 1990). Further, premises are rarely discussed and the results are assumed to confirm the hypothesis or prediction. Not only do cookbook-type activities model faulty reasoning, but students can successfully complete them without much thought (and thinking is what is required for students to construct concepts).

What can be done instead? Activities and investigations in the field and in the classroom can be less structured like recipes and more like the investigations of real scientific work. Instructional activities also can be designed to engage students in more student-to-student discussion and debate focused upon scientific ideas, and more collaborative group work (Lemke, 1990; Larochelle & Desautels, 1991). The computer can be used to engage students in a variety of scientific simulations, or 'microworlds' (diSessa, 1988). Further, students can be taught to be more aware of their expectations, their own theoretical biases, as they carry out investigations (Gowin, 1987). Lastly, exemplars of the creation and negotiation of scientific knowledge from the history of science can help students learn knowledge of science, as well as scientific knowledge (Matthews, 1987).

Conclusion

Science is valuable because it offers coherent explanations of the world which help us *interpret*, or make sense of our experience (Broudy, 1973). Ecosystem theory, for

which helps us determine if and why we should pay any attention to such changes, or personally act to influence the situation.

In my own work in science teacher education, I encourage educators to consider the problems of science teaching and learning from the constructivist perspective. The present time is one in which the implications of this theory for classroom practice are beginning to be explored and evaluated. In this generative conception of science teaching, the teaching-learning process is regarded as a complex process, involving motivation and rapport, a variety of learning materials, and many factors outside the teacher's control. The process involves a dynamical negotiation of meaning between the learner and the environment. New software, better textbooks, and new materials are helpful, but the most sound way to improve schooling is to better educate teachers and to provide them with the tools and conditions they need to facilitate their students' learning. The Community Resource Curriculum Development Project is a step in that direction. Through the collaborative work involved in fashioning the following several units, the Chicago educators who participated further developed their own scientific concepts and pedagogical competence, while building a professional and community support network.

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compiled by Mary Nalbandian
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708/839-6897

**McKinley, Ada S.
Community Services, Inc.**
725 South Wells Street
Chicago, IL 60607
544-0600

Mexican Fine Arts Center Museum
1852 West 19th Street
Chicago, IL 60608
738-1503

Mitchell Indian Museum
Ms. Jane Edwards
Kendall College
2408 Orrington
Evanston, IL
708/866-1395

Morton Arboretum
Mr. Dilip Das
Route 53 and I-88
Lisle, IL 60532
708/719-2465

Museum of Science and Industry
Ms. Eileen Bradley
57th Street and Lake Shore Drive
Chicago, IL 60737
684-1414 ext. 2389

North Park Village Nature Center
5801 North Pulaski Road
Chicago, IL 60646
744-5472

People's Gas Light & Coke Company
Mr. Robert Denne, Community Relations
122 South Michigan Avenue
Chicago, IL 60603
431-4930

Polish Museum of America
984 North Milwaukee Avenue
Chicago, IL 60622
384-3352

River Trail Nature Center
3120 Milwaukee Avenue
Northbrook, IL 60062
708/824-8360

Rosehill Cemetery
5800 North Ravenswood Avenue
Chicago, IL 60660
561-5940

Sand Ridge Nature Center
15890 Paxton Avenue
South Holland, IL 60473
708/868-0606

Shedd Aquarium
Ms. Linda Wilson
1200 South Lake Shore Drive
Chicago, IL 60605
939-2426

University of Illinois
Cooperative Extension Service
25 East Washington, Suite 707
Chicago, IL 60602

Willowbrook Wildlife Haven
525 South Park Boulevard
Glen Ellyn, IL
708/790-4913

Eco Eco....

Community Resource Curriculum Development Project

Developed by: James H. Smith

Eco Eco....

"Life is a precious gift that must be treasured and respected.
It is this life and its interaction with other living and non living
things that make life so memorable and honored.
Today we are faced with the challenge of old to allow life
in all its forms to develop, live and flourish to its full capacity
without destructive intervention."

James Smith
Teacher, Leslie Lewis Elementary School

Rationale

This unit is intended to meet the following Instructional Program Objectives for the following Illinois State Goals for Learning at the second-grade level:

LANGUAGE ARTS

Identify cause and effect relationship.
Obtain info from visual aids.
Use glossary or dictionary for word meaning.

WRITING

Use appropriate heading on paper.
Use the writing process to compose a descriptive essay selection.

SCIENCE

Recognize the Sun as the principal source of the earth's energy.
Identify factors that limit the ability of animals and plants to grow and reproduce.
List the characteristics of living organisms.
List the characteristics of non living organisms.
Use appropriate scientific vocabulary.

Content Background

BOOKLETS AND PAMPHLETS:

Lincoln Park ZOOBOOK 1990
Future in the Wild (World Wildlife Fund-US)
Zoo-cology ACTION GUIDES (for field trips)
Endangered Species (U.S. Department of the Interior)

NEWSPAPER ARTICLES:

An Evolving Field, by Stevenson Swanson, May 1993. Saving wildlife now means preserving ecosystems and even economies,

COMPUTER SOFTWARE:

Animal Life Databases by Sunburst
Food Chains and Webs by Silver Burdett
The Balance in Nature by Focus Media
The Environment by Ellen Nelson Learning Library
Decisions, Decisions: The Environment by T. Snyder

BOOKS:

Bolton, Sarah K. *Famous Men of Science (4th ed)*. New York: Crowell Jr. Books, 1960.

Bonnet, Robert L. and Keen, G. Daniel. *Botany: 49 Science Fair Projects*.
PA: Tab Books, 1989.

Cornell, Joseph. *Sharing Nature with Children*. CA: Dawn Publications, 1979.

Dumming, Dorothy C. *Experiments in Biology*. Dubuque, IA: Kendall Hunt, 1986.

Feldman, Anthony and Ford, Peter. *Scientists and Inventors*. NY: Facts on File, 1979.

Gardner, Robert. *Famous Experiments You Can Do*. USA: Franklin Watts, 1990.

Gutnik, Martin J. *Experiments That Explore the Greenhouse Effect*. USA: Martin J.
Gutnik, 1991.

Integrated Elementary Units. *Community Resource Curriculum Development
Project*. Fall, 1993.

Spurgeon, Richard. *Ecology*. London: Usborne Publishing Co., 1988.

Stein, Conrad. *America the Beautiful: Illinois (5th printing)*. USA: Regensteiner
Publishing Enterprises, Inc., 1987.

Steffens, Bradley. *Animal Rights: Distinguishing Between Fact and Opinion*. CA:
Greenhaven Press, Inc., 1989.

Stone, Lynn M. *Pond Life*. USA: Regensteiner Publishing Enterprises, Inc., 1983.

Timeline for Unit

This unit is divided into six lessons. These lessons can last for 8 to 12 weeks depending on the number of class sessions that are allotted. This unit was intended to be taught during the spring, summer, and autumn time of the year to allow full advantage of resources as well as the observation of various organisms in the interaction with an active environment. Keep in mind that all field trips and outside activities must be approved at the school level and

with the facility that will be visited. We recommend doing Lesson 4 after the field trip.

Evaluation/Assessment

Using higher-order thinking skills, students will express opinions and report on the importance and necessity of protecting the ecosystem. Given the opportunity as individuals or as members of a cooperative group, children can display their understanding of the unit's concepts in a variety of activities including and not limited to debates on the pros and cons of protecting the animals, rainforests and organisms that are important to the active interrelationship of the ecosystem at all levels. Essays, homework assignments, oral and written reports, data sheets and drawings will also be used in assessing the students. Portfolios will be kept to showcase student work and will be evaluated by both the student and teacher.

Community Resources

Brookfield Zoo
3300 S. Golf Road
Brookfield, IL 60513
708/485-0263, ext. 360

The Chicago Academy of Sciences
2001 N. Clark Street
Chicago, IL 60614
312/549-0606

Lincoln Park Zoo
2200 N. Cannon Drive
Chicago, IL 60614
312/294-4649

US Fish and Wildlife Service
Rosemont, IL 60018
708/298-3250

Field Museum of Natural History
Roosevelt Road at Lake Shore Drive
Chicago, IL 60605
312/922-9410

Chicago Botanical Garden
Lake Cook Road at I-94
Glencoe, IL 60022-0400
708/835-5440

Chicago Historical Society
1601 N. Clark Street
Chicago, IL 60612
312/642-4844

Animal Fund for Alternatives to Animal Research
175 W. 12th Street #166
New York, NY 10011
212/989-8073

Animal Legal Defense Fund
1363 Lincoln Avenue #7
San Rafael, CA 94901
415/459-0885

Animal Rights Information and Education Service
P.O. Box 332
Rowayton, CT 06853
203/834-0200

Game Warden
International Association of Fish and Wildlife Agencies
444 N. Capital Street NW #534
Washington, DC 20001

National Hunters Association
P.O. Box 820
Knightdale, NC 27545
919/365-7157

National Wildlife Association
8925 Leesburg Pike
Vienna, VA 22184-0001

Hunter Education Association
P.O. Box 525
Draper, UT 84020
801/571-9491

Wildlife Legislative Fund of America
801 Kingmill Parkway
Columbus, OH 43229-1137
614/888-4868

Career Connections

Contact these organizations for information about the following careers:

ANIMAL NUTRITIONIST

American Academy of Veterinary Nutrition
c/o IAMS, 2395 Clower Street
Snellville, GA 30278

MARINE MAMMAL TRAINER

American Association of Zoological Parks and Aquariums
Oglebay Park
Wheeling, WV 26003

DAIRY FARMER

Wisconsin Dairy Council
6300 North River Road
Rosemont, IL 60018

FISH FARMER

American Fisheries Society
5410 Grosvenor Lane, Suite 110
Bethesda, MD 20814

ZOO BIOLOGIST

American Society of Zoologists
104 Sirius Circle
Thousand Oaks, CA 91360

VETERINARIAN

American Veterinary Medical Association
1931 N. Meachum Road
Shampaign, IL 60173

ANIMAL SHELTER FOREPERSON

ASPCA Animal Rescue
2336 Linden Boulevard
Brooklyn, NY 11208

GAME WARDEN

International Association of Fish and Wildlife Agencies
444 N. Capital Street NW #534
Washington, DC 20001

Any college or university that offers an agricultural, botanist, horticultural and environmental studies program can provide some valuable resources.

LESSON 1: Dead or Alive

Lesson Introduction

In this lesson, students will be introduced to the environment. They will spend at least thirty to forty minutes quiet time sitting in a park, by a lake, around the school building or looking out of the window observing the interaction between living organisms, and between living and non living things.

Specific Lesson Objectives

The students will:

1. distinguish between living and non living things.
2. use appropriate scientific vocabulary.
3. illustrate through drawings or essays what was observed.

Time Allotment

This lesson can be completed in two 40 or 50-minute sessions.

Materials

construction paper
writing paper
crayons
copies of student data sheet
journals
pencils or pens

Procedure

Tap Prior Knowledge

1. Ask the students what the term "environment" means. Have them write their responses in their journals and continue to refer back to them later, as they develop a better understanding throughout the lessons in this unit.

Activity

2. Take the class outside, if possible, or gather by the windows. Place the students far enough from each other so that they will not interrupt each other or distract some of the other organisms and animals in the environment. Have them sit and make observations for about forty to fifty minutes. Let them know that whatever they come up with, it is not right or wrong as such, but they should be able to explain and record what was observed.

Introduce Principle/Concept

3. In the following session, discuss the students' observations. Introduce the term "interaction." Ask students to give examples of the term. Have students name the many living and non living things that they could see and have recorded using "What I Saw..." (data sheet 1.1). Have students share

their drawings and describe all their observed interactions between the organisms and their environments.

Student Data Sheet Masters
What I Saw...

Home Activity/Parent Involvement

Students will write brief paragraph describing any organism they want and the other students will have to guess what it is. This paragraph could be a riddle describing the animals' habitat, appearance, etc. without saying what the animal or creature is. Whoever guesses the answer gets to read his/her riddle and/or a prize. Examples are below.

e.g. #1-- Since we can do only the work Mother Nature has given us, we wish humans would be a little more understanding when we mistakenly go to work in their towns. If we stopped our forest labors, humans would soon see the value of our work; for the very thing they are trying to protect would soon be denied them. We reduce fallen trees to humus by our eating habits, making soil nutrients once again available for plants and trees to grow on.

e.g. #2--I do my part to control the rodent population. This greatly benefits the plant world and helps the farmer, too. Nevertheless, most of you humans don't like me and fear me. What you don't realize is that I'm just as afraid of you as you are of me. It would reduce tensions a lot if you would watch where you put your feet. If I think you're about to step on me, I'll let you know where I am.

Answers: #1 termites #2 rattlesnake

LESSON 2: Environment

Lesson Introduction

This lesson should build upon the previous lesson. Students will see how all things in nature are interrelated. The definition of ecology is the study of how all living things interrelate with each other and with their non living environment. It may be difficult for younger students. Remove the data sheet if you are doing it with students below second grade.

Specific Lesson Objectives

The students will:

1. use the dictionary.
2. write complete sentences of vocabulary words.
3. have a working knowledge of the concepts and basic vocabulary of biological, physical and environmental science and their application to life and work in contemporary technological society.

Time Allotment

This lesson can be completed in two to three 40 or 50-minute sessions.

Materials

dictionary
encyclopedia
copies of student data sheet
pencils or pens

Background Information

There are two aspects to the environment, the physical (non living) and the biological (living). Together, they make up the biosphere, any place on earth where life can exist.

There are four types of non living things within the biosphere: air, water, soil, and light energy. These four non living components must all exist and be in balance for life to exist. If any one of these non living things is not present, life as we know it cannot exist. When all four non living things are present, we have what is referred to as interface.

Besides being totally dependent on the physical aspects, the biological aspects of the biosphere are also totally interrelated to one another. They are interrelated through the transfer of energy. Most forms of energy within the biosphere come from solar energy- the energy emitted by the Sun. They have simply been transformed in one way or another, The grazing food web is a way of transferring and transforming solar energy.

Here is how it works: All food relationships within the biosphere take place within the biomes, those communities of living organisms forming a single,

major ecological region. Some of the earth's biomes are rain forests, tundra, deciduous forests, deserts, and grasslands. Within each biome are specialized areas called ecosystems, where specific food relationships take place. Some specific ecosystems are marshes, ponds, bogs, and woodlots.

In ecosystems, all food relationships begin with green plants, the producers. Green plants form the basic structure of the grazing food web. They are the only living things that can make food. All other organisms are consumers. Through the process of photosynthesis, the coming together of CO₂ (carbon dioxide) and H₂O (water) to yield, green plants absorb sunlight without it the process cannot take place, convert it to chemical energy, and use this energy to manufacture glucose C₆H₁₂O₆ a simple sugar. They store this glucose and also convert it to fats, proteins, proteins, and carbohydrates. The opposite of photosynthesis is called respiration. This is when glucose, a carbohydrate, is broken down into carbon dioxide and oxygen. Plants perform the process of photosynthesis and animals perform the process of respiration.

The next level of the food web consists of herbivores, animals that eat only green plants. These animals are capable of converting the energy stored in plant tissue (cellulose) into animal tissue. They have specialized teeth, stomachs, and intestines that enable them to digest it.

Herbivores are an essential part of the food web, or energy transfer system. Without them, energy could not be transferred and other organisms could not exist.

Carnivores are animals that eat only meat. These animals are well adapted for their role within the ecosystem. Most have sharp teeth and claws that they use for capturing and killing their prey.

There are many levels of carnivores. First-level carnivores feed directly on herbivores. Second-level carnivores feed on the first level, and so on. The next level within the food chain web consists of the omnivores. Omnivores get their name from the Greek word omni, meaning "all". Omnivores eat both vegetation and meat. Most omnivores are predators- hunters. And most animals under them are prey- the huntee.

Procedure

Tap Prior Knowledge

1. In a class discussion, ask the students to give definitions for the vocabulary words listed below. Accept their responses and allow them to correct themselves as they continue with the lesson.

interaction
animal
insects
food web
interface
omnivores
consumers
respiration

living
carbohydrates
prey
ecology
biomes
ecosystems
glucose
carnivores

non living
organisms
predator
biosphere
producers
herbivores
photosynthesis

Activity

2. Play the Pyramid of Life. Give each student a card and have them secretly write on it the name of an organism, such as a plant, insect, and animal that lives in the area. The players are going to build a pyramid, just as they might do in gym class, but don't tell them this until after you've collected all the slips of paper. Now the fun begins: "From what source does the earth get its energy? (From the sun!) Right. What form of life is the first to make use of that energy? (Plants!) Right again. Now we're going to build a pyramid."

A few groans may be heard when the "plant children" realize their fate. The plants will be on the bottom, because all animals depend on them directly or indirectly for food. All the plants kneel down here on all fours, close together in a line. Now, read off the animals from the slips of paper, and have the class tell you whether they are plant-eaters or meat-eaters. All the plant-eaters (herbivores) stand in a line behind the plants. All the meat-eaters (carnivores) stand in another line behind the herbivores.

There will nearly always be more children in the upper-level groups than in the supporting plant levels; it's a lot more fun to be a bear or mountain lion than it is to be a dandelion or a muskrat. Humility, alas, seldom stimulates the imagination. With so many tops and so few bottoms, it will be impossible to build a stable pyramid. Some of the predators will just have to forfeit their exalted status. Challenge the children to reconstruct their own pyramid into one that will easily support all of its members. (Tell the bigger children that they can change to plants if they wish.)

Introduce Principal/Concept

3. Clearly, the higher up in the food chain, the fewer the number of animals there are. Demonstrate the importance of plants by pretending to pull one of them out of the pyramid. List the main types of biomes. Compare/contrast biomes.

Student Data Sheet Masters

Review Questions

Home Activity/Parent Involvement

Have students create at least five food webs with four or five levels. The students can review their vocabulary by explaining it to parents.

LESSON 3: Light and Plants Together: Photosynthesis

Lesson Introduction

In this lesson, the students will continue to learn about parts of the ecosystem. The students will describe how plants use air, water, and sunlight. They will understand that plants produce their own food, are an important part of the food chain, and that all living things are dependent upon green plants.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. describe human interdependence upon green plants.
3. demonstrate that an inference can be made from a simple experiment.
5. have a working knowledge of the principles of scientific research projects.

Time Allotment

This lesson can be completed in one 40-minute session.

Materials

mature, medium to large-sized plants
large pictures or drawings of plants
paper
copies of student data sheet
journals
pens or pencils

Advanced Preparation

Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge

1. Ask students "How do plants use air, water, and sunlight? How do plants get their food?"

Share with Neighbor

2. With partners, let the students identify the plant parts that they feel directly use air, water, and sunlight. Example: "roots take water from the ground."

Activity

3. Students should examine mature plants as they form their hypotheses. Display a picture of a plant in addition to the actual mature plant. Discuss how plants use water, air (carbon dioxide) and sunlight (energy) to produce their own food (glucose).
4. Distribute "Plant Diagram" (data sheet 3.1) and have the students draw and label their plants.

Introduce Principle/Concept

5. Explain that during this process called photosynthesis, plants give off oxygen which humans and other animals need to live.
6. Hold up a few solid green plants and ask "What do the leaves on all of these plants have in common?" (They are all green.) "How might we find out what causes the green color in plants." Give the students the opportunity to brainstorm ways to investigate. Explain that the food for plants is made in the plant's leaves and that the green in the leaves is caused by a pigment, or coloring matter called chlorophyll. Chlorophyll plays a key role in trapping the light energy that green plants use to make their own food.

Relate Activity and Concept

7. Complete "Laboratory Project" (data sheet 3.2). Using their journals, have the students make notes about environmental elements used by plants and the specific plant part that uses each element. Water is used by roots, carbon dioxide is used by leaves, light energy is used by leaves, glucose/sugar is produced by leaves, oxygen is produced by leaves. What can they infer from leaves that are green and yellow in color?

Safety

Discourage the students from putting the leaves in their mouths.

Summary

Students should answer these questions in writing in a journal entry or orally in conversation with the teacher:

1. Can you identify the plant part that produces food for the plant?
2. What do plants need to produce food for themselves?

Student Data Sheet Masters

Plant Diagram

Laboratory Project

Laboratory Project Questions

Lesson Assessment

Collect the students' data sheets and check for completion and accuracy. Ask each student to answer the summary questions either in writing in a journal entry or orally in conversation (data sheet 3.3) Note participation in class activities. Store students' work in their portfolios.

Extension Activities

Books to Read

Looking at Plants by David Suzuki, Wiley, 1992

Additional Community Resource Excursions

Arrange a trip to Garfield Park Conservatory.

LESSON 4: Habitats

Lesson Introduction

In this lesson, the students will learn more about habitats. They will define and give specific examples of habitats and recognize that food, water, and shelter are basic necessities of all habitats.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. compare and contrast specified environmental conditions.
3. analyze the ways in which natural resources and land are used (and recognize the need to conserve natural resources).

Time Allotment

This lesson can be completed in one 40-minute session.

Materials

dictionary
pictures of habitats/laminated posters
blindfold
paper
crayons or markers
copies of student data sheet
journals
pencils or pens

Advanced Preparation

Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge

1. Write the term "habitat" on the chalkboard and have it pronounced. For younger students, be sure to show pictures of habitats so they can have the visual. Have students brainstorm definitions and list them on the board. Have a student read the actual definition from the dictionary. (The place where an animal or plant naturally lives or grows.) Let the students determine which of their previous definitions still apply.

Share with Neighbor

2. In their groups, let the students describe several habitats: their own, and those the animals share. How do we use our natural resources and land? Do we put them to the best possible use? What do we need to survive in our habitats? What is the difference between "need" and "want"?

Activity

3. Distribute "About My Home" (data sheet 4.1) and let each student/group complete it using an animal or organism that they saw in their observation in Lesson 1.

4. Play the Predator-Prey Game. This game introduces food chains and the way they work in nature. In an open area of the room, or on the playground, form a circle about 15 feet across. Blindfold two of the children. Ask one to name a predator that lives in the area and the other child to name a prey. The predator tries to catch her prey by listening carefully, then tracking it down and tagging it gently. If either animal goes too near the edge of the circle, the children tap it twice. Stress the need for silence during the game, and have the players make things more realistic by imitating the animals they have chosen to be. For variety, experiment with different numbers of predators and modify their strategies of hunting and avoiding capture. If your predator is not as bold as he could be, and interest is lagging, tighten up the circle, bringing the predator and prey closer together.

Introduce Principle/Concept

5. Teach the students to appreciate the habitat of animals and humans as well as other organisms. On a blank piece of paper or in their journals, have the students design their own habitats including, but limited to, what they need and want in order to live?

Home Activity/Parent Involvement

Sketch two ways that people affect an animal's habitat in either its food, water, or shelter. Describe each drawing in a sentence or two below it. Continue to compare and contrast the various biomes using "Biomes" (data sheet 4.2)

Student Data Sheet Masters

About My Home
Biomes

Lesson Assessment

Collect each group/person's completed data sheet. Note student participation in the class discussion. Save students' work in their portfolios. Special Note: give students feedback on a daily basis on their progress and the meeting of goals and expectations.

LESSON 5: Community

Lesson Introduction

In this lesson, the students will be introduced to the relationships in the environment. They will discuss and show these relationships between organisms and their roles in the environment.

Specific Lesson Objectives

The students will:

1. distinguish between biotic factors and abiotic factors.
2. use appropriate scientific vocabulary.
3. explain and identify the components of a biosphere.
4. illustrate through drawings and/or examples what takes place in an ecosystem (creativity is encouraged).

Time Allotment

This lesson can be completed in two or three 40 to 50-minute sessions.

Materials

cards

string

pictures of animals including various other organisms interacting or feeding

Advanced Preparation

Arrange students into cooperative groups (or you may decide to have them work individually, if time permits).

Procedure

Tap Prior Knowledge

1. Introduce the lesson by asking students "What do animals need for survival?" List their responses on cards and put them on the chalkboard or on a big board so the students can see them together. Do the same with plants.

Share with Neighbor

2. After you feel the students were conclusive with responses, show how plants and animals are interacting and providing needed material for each other. Inform the class that there are a lot of "things" living and "non living" that make up the environment. Some of the needs were non living things. Have them identify which are living and which are non living.
3. If possible allow students to observe life around a pond, a puddle of water, a lake, or a human-made pond at a park or zoo before going on with the lesson.

Activity

4. Play the Web of Life. Here is a game that makes very clear the essential interrelationships among all the members of nature's community. Webbing vividly portrays how air, rocks, plants and animals function together in a balanced web of life. The students form a circle. The leader stands inside the circle near the edge, with a ball of string: "Who can name a plant that grows in this area?" (Dandelions.) "Here, Miss or Mr. Dandelion, you hold the end of the string. Is there an animal around here that might eat the dandelion?" (Rabbits!) "Ah, a sumptuous meal...Miss/Mr. Rabbit, you take hold of the string here; you are connected to Miss/Mr. Dandelion by your dependence on her flowers for your lunch. Now, who needs Miss/Mr. Rabbit for his/her lunch?"

5. Continue connecting the students with string as their relationships to the rest of the group emerge. Bring in new elements and considerations, such as other animals, soil, water, and so on, until the entire circle of students is strung together in a symbol of the web of life. You have created your own ecosystem.

Introduce Principle/Concept

6. To demonstrate how each individual is important to the whole community, take away by some plausible means one member of the web. For example, a fire or a logger kills a tree. When the tree falls, it tugs on the strings it holds; anyone who feels a tug in her string is in one way or another affected by the death of the tree. Now everyone who felt a tug from the tree gives a tug. The process continues until every individual is shown to be affected by the destruction of the tree.

Relate Activity and Concept

7. Have the students read or you read to them, *Pond Life* by Lynn Stone

Home Activity/Parent Involvement

8. Check your local public broadcasting station for showings of various wildlife programs and write a brief report on what was shown.

Extension Activities

How has the environment changed since people have moved into certain areas?

How has society changed? Take any time period.

How has the biosphere changed?

Additional Community Resource Excursions

Plan field trips to Lincoln Park, Garfield Park, or to any place that has a pond. You should take water samples and soil samples. You could use a microscope to analyze the tiny creatures which live there.

LESSON 6: Rights

Lesson Introduction

In this lesson, students will use all previous learned knowledge to debate their positions on the conservation of the environment and the rights of animals.

Specific Lesson Objectives

The student will:

1. obtain information from visual aids.
2. be able to identify factors that limit the ability of animals and plants to grow and reproduce.
3. be able to identify cause and effect relationships.
4. be able to make oral reports.

Time Allotment

This lesson can be completed in one 40 to 50-minute session.

Materials

newspaper articles on various advertisements depicting animal rights/liberation or National Rifle Association, an organization that supports hunting or some type of nature article.

Procedure

1. Look at editorial cartoons, as well as other cartoons found in the paper, with the class. These are an effective way to give an opinion because they are fun to read and easy to remember. Have students identify the cartoons' opinions. See if you can find a cartoon that uses a fact to back up its opinion.
2. Students could write to various animal rights organizations, National Rifle Association, and others soliciting information on the reasons and concerns they have for people, animals, and the environment.

Home Activity/Parent Involvement

Watch your local Public Broadcasting station for some possible broadcast on debating.

Assessment

1. Whose rights are more important: animals or humans?
2. Are you for or against animals used in experimentation?
3. Does hunting hurt wildlife or does it help?

Student Data Sheet Masters

Eco Eco...
Student Data Sheet Master 1.1

Dead or Alive

What I Saw...

Living

Non Living

What do living things do or have that makes the different from non-living things?

Eco Eco...
Student Data Sheet Master 2.1

Environment

Review Questions

1. What are the 4 major types of non living things within the biosphere?
2. Define ecology.
3. Name two of the biomes. Describe them.
4. Where does the main source of energy come from in the food web?
5. Put these in order as they appear in the food web.

_____	herbivores
_____	first level carnivores
_____	omnivores
_____	producers

6. What happens in photosynthesis?
7. Name two types of ecosystems.
8. What is a food web?
9. Name the only living thing that can make its own food.
10. Name these organisms using P for producer, H for herbivore, and C for carnivore. Some items can have more than one answer.

a) tree	b) cat	c) frogs
d) fish	e) rabbits	f) dandelion
g) humans	h) snake	i) bear
j) duck	k) cow	

Eco Eco...
Student Data Sheet Master 3.1

Photosynthesis

Plant Diagram

Draw and label your plant.

Photosynthesis

Laboratory Project

Overview

The leaf is the part of the green plant that does the chemical work of photosynthesis. It takes in carbon dioxide and sunlight. Water is transported from the root system in the presence of a special compound, chlorophyll, so the leaf can make food. How would covering one leaf or several leaves affect the plant? Will it cause the plant to produce more or bigger leaves? Will the plant become less healthy?

Materials

4 healthy indoor or outdoor plants (each must have five leaves)
2 or 3 square feet of dark plastic (from a garbage or lawn bag)
masking tape
ruler

Procedure

Count the number of healthy leaves on each plant. Determine if they are of similar size. A good method would be to count them in parts. The largest with the smallest; the second largest with the second smallest; and so on. The middle group would be the average size. Measure the averaged-size leaves (two or three pairs) and calculate the total area of leaf surface. Cover the middle or average pair with the dark plastic. Be sure to poke some holes in the underside of the plastic to allow air to flow in and out while restricting light.

Calculate the percentage of surface cover and write it on the tape. Place it on, or near, the plant container. Set up the second and the third plants with 50 and 75 percent, respectively, covered. The fourth plant should be covered completely. Be sure to identify each plant with the percentage of covered area. Each plant must receive the same amount of sunlight, water, and temperature. The only difference should be the amount of leaf surface exposed to sunlight.

Observe the overall condition of the plants. Determine whether one plant forms more or new leaves faster. Conclude whether your hypothesis was supported based on the results.

1. If you used a clear plastic bag, would the outcome be the same as when you used the dark colored bag?
2. Which plant demonstrated the most photosynthesis?
3. Which plant demonstrated the least photosynthesis?
4. Explain the results of your experiment.

Eco Eco...
Student Data Sheet Master 3.3

Photosynthesis

Laboratory Project Questions

Answer the following questions.

1. Why are the leaves green?
2. How does water go into the plant?
3. What kind of gas is absorbed through the leaves of the plant?
4. What is the function of the stem?
5. Glucose is produced by what part of the plant?
6. Plants are called (carnivores, omnivores, producers, decomposers, herbivores).
7. What kind of gas is given off by the plant?
8. What is the function of the root?
9. What is the purpose of chlorophyll?
10. Explain how plants use carbon dioxide and water, in the presence of light, to produce glucose.

Eco Eco...
Student Data Sheet Master 4.1

Habitat

About My Home

Name:

Location

Water

Habitat

Food

Land

Preys

Name some of the animal's predators:

Eco Eco...
Student Data Sheet Master 4.2

Habitat

Biomes

TUNDRA

DESERT

SAVANNAH

RAINFOREST

GRASSLAND

The Four Seasons of the Year

Community Resource Curriculum Development Project

Developed by: Friedricka White

The Four Seasons of the Year

Rationale

This unit is intended to meet the following instructional objectives for the Illinois State Goals for Learning at the kindergarten level:

BIOLOGICAL AND PHYSICAL SCIENCES

Use appropriate scientific vocabulary.

Describe conditions that allow life to exist.

Compare and describe objects using the five senses.

Compare the seasons.

Explain why experiments are conducted.

Describe and chart various types of matter by color, shape, and texture.

Describe patterns in the environment and recognize the regularity of their appearance.

Identify similarities and differences in a set of objects or events.

Recognize science-related careers and avocations.

SOCIAL SCIENCES

Cooperate in making group decisions.

Determine why people work.

Recognize individual traits, abilities, and feelings in self and others.

Identify seasonal changes and the ways in which people adapt to them.

MATHEMATICS

Combine and separate objects corresponding to sums through 6.

Compare the size of objects- length, height, and weight.

Tell which activity takes more or less time.

Record data using tally marks.

Recognize patterns.

Explore estimation strategies.

Use math in other curriculum areas.

Content Background

Kindergarten children are very curious and in awe of everything that is happening around them. They will have no trouble with the observations that they will make in the weather and natural surroundings during the four seasons. In fall or autumn, for example, they will readily notice it is getting cooler and that mornings are darker when they come to school. In every season, they will see changes in the natural world and recognize how the sky and earth look different.

These changes are caused by the way the earth travels around the sun. In the fall, days are shorter and less heat from the sun is getting to the earth. Air

gets cool and crisp instead of warm and humid. Thirteen weeks of fall usually begin around September 21st and end December 21st. (The calendar should be introduced to the students at the beginning of the unit.) Every season of the year will offer exciting changes to look for outdoors and children can be told of some of the fun and nature trips they are going to take each season.

Prepare for the unit activities by reading some of these books:

Caps, Hats, Socks, and Mittens, by Louise Borden, Scholastic Inc., 1989.
Exploring Nature Around the Year (a book for fall, winter, spring and summer is available) by David Webster, Simon & Schuster, 1989.
January Brings the Snow, by Sara Coleridge, Dial Books for Young Readers, 1986.
Seasons, by Illa Podendorf, Children's Press, 1981.
When Summer Ends, by Susi Gregg Fowler, Greenwillow Books, 1989.
Word Birds Fall Words, by Jane Belk Moncure, The Child's World, Inc. 1985
(There are books in this series called *Word Birds Winter Words*, *Word Birds Spring Words*, and *Word Birds Summer Words*, also).

Timeline for Unit

This unit of work will be divided into the four seasons of fall, winter, spring, and summer. Since school begins in the fall of the year, we will begin with fall first. Try to take related field trips during each season.

Concentration of lessons will be in the areas of

- a) nature changes
- b) activities of animals and people
- c) classroom and outdoor investigations and activities for the particular season being studied.

Evaluation/Assessment

Students will show understanding of the seasonal changes during each period and will be able to relate stories that are read to them, with some of their own experiences and be able to talk about them to the class. Children will be able to recite poems, sing songs, and discuss the investigations they are conducting during each seasonal period. Students will also be able to show their "Seasonal Scrapbooks" of magazine pictures, their own drawings, and photographs they have been working on throughout the year. They will be able to tell the days of the week, months of the year, and understand the uses of the calendar. As a group, the children will complete a "museum (collection table) for all seasons" and, finally, they will dictate stories of their own experiences and observations for the classroom "experience chart" or individual scrapbooks.

Community Resources

Chicago Botanic Garden
Lake Cook Road and I-94
Glencoe, IL 60022-0400
708/385-5440

Lincoln Park Zoo
2200 N. Cannon Drive
Chicago, IL 60614
312/294-4649

Lincoln Park Conservatory
Fullerton and Stockton Drives
Chicago, IL 60614
312/294-4770

Garfield Park Conservatory
300 N. Central Park
Chicago, IL 60624
312/533-1281

North Park Village Nature Center
5801 N. Pulaski Road
Chicago, IL

Sand Ridge Nature Center
15890 Paxton Avenue
South Holland, IL 60473
708/868-0606

Career Connections

Some career fields of interest in the study of seasons might be florist, teacher, curator or employee of a zoo, conservatory or nature center.

Glossary

CALENDAR: table of months and days

COLLECTION: a gathering or accumulation of things

CONDENSE: to turn from vapor into liquid

CRICKET: a small, chirping insect

DECAY: to rot, break up, or fall away

EVAPORATE: to turn into vapor

FLOWER: the colored part of a plant from which the fruit is developed

GERMINATE: when a seed sprouts and begins to grow

HIBERNATE: pass the winter sleeping or at rest

INSECT: an animal without a backbone, having three separate body parts, two antennae, four wings, and six legs

MAGNIFY: to increase the apparent size with a special lens

MIGRATION: move from one place to another

NATURE: power underlying all phenomena in the material world

OBSERVE: to take note or pay attention to

SEASON: one of the four divisions of the year associated with a type of weather and a stage of agriculture

SEED: one of the grains of fruits or plants

SPROUT: send forth a shoot of a plant

SWEAT: moisture coming from the skin

VACATION: a period of time away from work or home for recreation

VAPOR: a liquid or invisible moisture in the air

WEATHER: atmospheric conditions

Ideas for Nature Museum Table Collections

Fall

nuts, seeds, leaves, bird feeder

Winter

pine cones, twigs, pieces of evergreen, holiday bird feeder

Spring

rocks, pebbles, tree buds, feathers, straw piece, tree stump to show rings

Summer

sunglasses, bug house, decayed or molding material

Any other items that children want to bring in or can think of that would be appropriate to use in the collection table. They can be put under the correct heading even if you are not working on that particular activity.

At the end of the summer activities, have the class invite children from other rooms to view their Nature Museum Table of collections. The class can recite poems or sing songs that they have learned throughout the unit.

Papers and drawings of the individual students can be put together as scrapbooks to take home after they have been viewed. Don't forget to make up a book of "take home activities" that children can work on during the summer vacation.

A lot of Polaroid pictures will be great for your charts.

Lesson 1: Fall

Lesson Introduction

In this lesson, the students will learn, from direct observation and activities, the meaning of the seasonal changes for fall. At the start of each activity for the day, observe the date on the calendar, and check the weather outside. They will also be learning the "Season Song for Fall."

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. tell some of the ways animals and people prepare for winter during the fall season.
3. tell about the signs of approaching fall or autumn.
4. be able to recognize dates on the calendar.
5. recite fall related poems or songs.
6. dictate story for experience chart after participating in simple science investigations or planned trips and activities.
7. know that fall and autumn are the same.

Time Allotment

Two weeks will be divided into activities for the fall season. The activities in this lesson can be completed on different days.

Materials

leaves
newspapers
white paper
buttons or seeds
cut-out square or round construction paper
pipe cleaners
heavy books
apples, three or four different kinds, (have enough so that all the children can taste the variety)
shoe boxes (have students bring in)

Advanced Preparation

Along with the suggested series, prepare yourself and your students by reading some of the books suggested at the end of this lesson.

Prepare a bulletin board of fall pictures.

Have the table ready for holding the "Nature Museum" collections and papers for the children's scrapbooks.

Procedure

Tap Prior Knowledge/Share with Neighbor

1. Activity One. Ask the students "What are some of the signs that fall is approaching?" After discussion, take the children on a neighborhood walk and collect leaves, pebbles, soil, and other interesting things for the Collections Table. Observe changes on trees, grass, and any flowers you might see.

Hands-on Activity/Introduce Concept

2. Activity Two. Make leaf people. Distribute leaves, newspaper, white paper, buttons or seeds, construction paper cut-outs, pipe cleaners, and books. Place a bigger leaf on the sheet of paper which can be the body. Any of the smaller pointed leaves could be arms or legs. The construction paper cut-outs or buttons could be the eyes, nose, and mouth. Pipe cleaners could make antennae or have children draw them using their imaginations. After making shape, tape down on paper and press between newspaper sheet and put heavy books on top of papers. Talk about the many shapes, sizes and colors of leaves. See how many they can find that are alike in their own piles.

3. Activity Three. Apple Observations. Explain to the children that apples are one of the main fruits that are harvested in the fall. They have a skin that keeps them from drying out. Take two of the same kind of apple and pare one of them leaving the skin on the other. Observe what happens overnight. On the next day, look at the two apples. Does the skinless apple look like it is drying up or has it become smaller? Put them in a box and at the end of the two weeks, observe them again and see what has happened to each one.

4. Activity Four. Apple Tasting. Make a chart with the name of each kind of apple sample you have for the children to taste. Cut a piece of each and ask which one they liked best, then tally the choice on the chart. Notice if the apple is red, green, sweet, sour. Have them observe shapes before cutting. Find as many differences as possible in the variety of apples. When tasting the apples, tell the children this is how big companies decide which apples to use for making apple pies or apple sauce. The people who do this job are called "tasters."

5. Activity Five. Begin Nature Museum Table. Each child will bring in a shoe box for nature collection. They can start bringing in seeds, sticks that might be used for making a bird's nest, stones, etc. Directions: These boxes can be set on the table. Tell them we will keep some of the collections for the table all year. We will call it the "Nature Museum Table." Collections for the table will come in during all of the seasons.

6. Have children dictate a story for the Experience Chart for the first week.

7. Activity Six. Making a Bird Feeder. Put some seeds and peanut butter on a plate for each child which s/he will mix up by hand. Cut the cups in half and

put four thumbtacks through the bottom so it can be stuck into a tree. Have the children fill up the halves with their mixtures and stick in a short pencil or stick on the bottom so the birds will have a place to perch. Take a few out to put on the trees outside the classroom and the rest can be taken home. Check in a few days or weeks to see if any of the seeds have been eaten. Be sure to tell children how must birds begin to migrate during this time of year so they will be warm and have enough to eat. We have made little feeders for some of the birds who may still be around.

8. Activity Seven. Preparation for trip to one of the nature centers. Read books suggested and talk about some of the things they will see at the center. Work on learning the season songs. Take a bus trip and have a picnic. Have children dictate stories and draw pictures about what they have observed on the trip. Place on bulletin boards. These pictures can later be put into students' "Season Scrapbooks."

Safety

Review the safety rules for outside play activities and for taking trips.

Home Activity/Parent Involvement

Parents will be invited to accompany children on field trips and help with room activities. They will also be asked to help students gather materials for their collections.

Lesson Assessment

At the end of the two weeks, children will show that they have mastered at least more than half of the specific lesson objectives and can recite or sing appropriate poems or songs for fall.

Extension Activities

Books to Read

175 Amazing Nature Experiments, by Rosie Harlow and Gareth Morgan, Random House, 1991.

As the Leaves Fall Down, by Aileen Fisher, 1977.

Autumn Days, by Ann Schweninger, Viking, 1991.

Fall, by Ron Hirschi, Cobbhill Books, 1991.

Lionel in the Fall, by Stephen Krensky, Dial Books for Young Readers, 1987.

My First Look at Seasons, by Darling Kindersley, Random House, 1990.

The Pumpkin Patch, by Elizabeth King, Dutton Children's Books, 1990.

Additional Activities

Children can have a "dried fruit" tasting party.

Naming the Seasons
Original Song about the Seasons
by Keena Thompson

Sing to the tune of "Ring around the Rosie".
Children can go around in a circle and "all fall down" as played in the game.

Naming all the seasons
To know them is the reason
Sun rays
Heat waves
Summer is done

Naming all the seasons
To know them is the reason
Colored trees
Falling leaves
Autumn is done

Naming all the seasons
To know them is the reason
Snow flakes
Icy lakes
Winter is done

Naming all the seasons
To know them is the reason
Rain falls
Bird calls
Spring is done

Naming all the seasons
To know them is the reason
There's four in all
We've said them all
Our Song is done.

A Song for Fall
by Friedricka White

Can be sung to the tune of "London Bridge is Falling Down"
or "Mary Had a Little Lamb."

We'll watch the seasons come and go
Come and go
Come and go
We'll see what happens autumn days
When we go out to play.

Leaves slowly change to red and gold
Red and gold
Red and gold
They fall off trees and touch the ground
As they come tumbling down.

The squirrels gather nuts to eat
Nuts to eat
Nuts to eat
They run and scamper all around
And hide them in the ground.

The birds fly south and stay til spring
Stay 'til spring
Stay 'til spring
They'll come back when it gets warm
And try not to find harm.

We'll dress warmly in the fall
In the fall
In the fall
Jackets, sweaters, we will get
As days grow colder yet.

We'll have fun on Halloween
Halloween
Halloween
We'll make the jack o' lanterns light
On that scary night.

Lesson 2: Winter

Lesson Introduction

In this lesson, the students will learn, from direct observations and activities, the meaning of seasonal changes for winter. At the start of each activity for the day, observe the date on the calendar, and check the weather outside. They will also be learning the "Season Song for Winter."

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. tell some ways animals and people live during the winter.
3. be able to recognize season changes for winter and note the holidays on the calendar.
4. recite winter related poems and songs.
5. dictate story for experience chart after participating in simple science investigations and activities.
6. know that the winter season follows fall and that spring will come next.

Time Allotment

Two weeks will be divided into activities for the winter season. The activities in this lesson can be completed on different days.

Materials

large plastic tray for bird bath
outdoor thermometer
dead leaves
small square of wire netting
a one gallon plastic milk jug with a screw top

Advanced Preparation

Prepare yourself and your students by reading some of the books suggested at the end of this lesson.

Procedure

Tap Prior Knowledge/Share with Neighbor

1. Activity One. Ask the students to tell you some of the things that make this "winter." After discussion, take a nature walk in the neighborhood. See if the ground is frozen. If the snow has fallen, are there any animal tracks? Are there any animals to be seen? Look for leaves that have begun to rot. Look for insects. They may be hiding from the cold in the leaves.
2. Activity Two. Have the children dictate a story of the walk they took. Make an experience chart for display on a bulletin board.

Hands-on Activity/Introduce Concept

3. Activity Three. Making a Birdbath. Put water in a plastic tray and set it outdoors so it can be seen from the classroom window. Once you are back inside, watch to see how long it takes for the water to freeze. Put the thermometer outside the window. Check to see if the temperature has reached 32 degrees F. Ask the students if they know why this temperature is special. This is the temperature it takes for water to freeze.

Observe to see if the birds are using the water for a bath. If the water freezes in the pan, bring it inside to thaw or set in a sunnier spot. Birds will take baths even when it is very cold. Their dirty feathers may stick together and leave less protection for birds if they are not clean. Why?

4. Activity Four. What happens to frozen water? Fill up the plastic jug with water and set someplace where it will freeze. Look at the container after it has frozen. Make observations. Has the ice pushed its way out of the sides or split open the plastic?

Explain to the children that when water freezes and changes into ice, it expands, or gets larger, and takes up more space. Relate to the water in the bird bath.

5. Activity Five. Work on the Nature Museum Table. Ask students to bring in include pine cones, twigs, dead leaves, bones, feathers, drawings of any tracks they might have seen on their own.

6. Activity Six. Take a trip to Lincoln Park Zoo to see how the animals are behaving in their own natural habitats during the winter season. Remind the children that they will not see the bears hibernating as they would in the woods which would be their true natural homes. See if they can think of things some of the other animals might be doing if they were in their natural habitats. Write an experience story on the trip to the zoo and have the children draw pictures for their scrapbooks.

Safety

Review the safety rules for outside play activities and for taking trips.

Home Activity/Parent Involvement

Parents will be invited to accompany children on field trips and help with room activities. They will also be asked to help students gather materials for their collections.

Lesson Assessment

At the end of the two weeks, the children will show that they have mastered at least more than half of the specific lesson objectives and can recite or sing the poems and songs for winter.

Extension Activities

Books to Read

175 Amazing Nature Experiments, by Rosie Harlow and Gareth Morgan, Random House, 1991.

A Happy Winter, by Karen Gundersheimer, Harper and Row Publishers, 1982.

A Winter Day, by Douglas Florian, Greenwillow Books, 1987.

Charlie Needs a Cloak, by Tomie de Paola, Simon and Schuster, Inc., 1973.

Nature Walk, by Douglas Florian, Greenwillow Books, 1989.

Our Snowman, by M.B. Goffstein, Harper and Row Publishers, 1986.

Winter's Coming, by Eve Bunting, Harcourt, Brace, Jovanovich, 1977.

Additional Activities

Make a holiday bird feeder. You will need: holiday decorations, oranges, donuts, pretzels, cookies, popcorn, pine cones, peanut butter, ribbons thread or yarn. Cut off the top third of an orange. Scoop out the inside and the skin will make a little cup. Poke 3 holes around orange and thread with ribbon or yarn. Put the bird seed and other ingredients inside the cup and take outside to hang on the tree near the classroom window. It will be colorful and a nice treat for the birds. Children can help by preparing the pine cones with the peanut butter and helping to eat some of the cookies...

Take children outside to put a few dead leaves under some wire netting. Pin it down with a brick or a heavy rock on each side. Find out what happens at the end of the next week. Have the children dictate the results for their experience charts.

Practice winter poems or songs. Children can make drawings of some of the things they have seen or collected for the table. Work on the Scrapbooks and Nature Museum Table.

Experiment with dirty snow. You will need: a container with fresh melted snow, a paper towel, a rubber band, an empty jar. Cover a jar with a paper towel and secure it with a rubber band. Pour melted snow water through the paper towel and see if there is any dirt caught on the towel. Have the students try to explain what happens. Does dust in the air get into the snowflakes before they hit the ground? Ask them if they would like to pick up a handful of fresh snow and eat it even when it looks clean, and after they have seen this demonstration.

A Song for Winter
by Friedricka White

Can be sung to the tune of "London Bridge is Falling Down"
or "Mary Had a Little Lamb."

We'll watch the seasons come and go
Come and go
Come and go
We'll see what happens winter days
When we go out to play.

We plant bulbs that we will watch
We will watch
We will watch
They'll bloom out in the springtime
With bright flowers that are fine.

Snow will fall around the town
Around the town
Around the town
We'll make snowmen and ice skate
Oh, I can hardly wait.

We'll have fun on holidays
Holidays
Holidays
Xmas, Hanukkah, and Valentines
We'll give gifts that will be mine.

We must dress in coats and boots
Coats and boots
Coats and boots
Gloves and mittens we must keep
When snow gets very deep.

Days are shorter in winter time
Wintertime
Wintertime
We'll take a walk or catch a bus
Before dark catches us.

Lesson 3: Spring

Lesson Introduction

In this lesson, the children will learn, from direct observation and activities, the meaning of the seasonal changes for spring. At the start of each activity for the day, observe the date on the calendar, and check the weather outside.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. tell some ways animals and people live during the spring.
3. be able to recognize seasonal changes for spring and note the holidays on the calendar.
4. recite spring related poems and songs.
5. dictate story for experience chart after participating in simple science investigations and activities.
6. know that the spring season follows winter and that summer will come next.

Time Allotment

Two weeks will be divided into activities for the spring season. The activities in this lesson can be completed on different days.

Materials

yarn or string
rocks
white paper
paper towels
birdseed
plastic wrap
containers
metal or glass pie plate
ice cubes
coffee cup with very hot water in it
straw to blow through the water

Advanced Preparation

Prepare yourself and your students by reading some of the books suggested at the end of this lesson.

Procedure

Tap Prior Knowledge/Share with Neighbor

1. Activity One. Ask the students to tell you some of the things that make this "spring." After discussion, take a nature walk in the neighborhood. See if the grass is turning green, what kinds of buds can be seen on branches or bushes. Have children collect rocks, branches, and any bones that might be found. See

if they can find flowers beginning to bloom already. Take some string or yarn along and look for trees of different sizes. Children can work in groups of 4 or 5 each and pick out a tree to measure with the string. Cut the string when each end meets, and when students get back to school, they can examine the lengths of string to see which group found the smallest, the biggest, or the same sizes, etc.

2. Activity Two. Have the students dictate a story of the walk taken the day before. Make an experience chart for display on the bulletin board and put other collections on the Nature Museum Table.

Hands-on Activity/Introduce Concept

3. Activity Three. Making soil. Distribute 2 rocks and a piece of white paper for each child. Have the students rub their rocks together as fast as they can and see if they can get any rock dust from them. The rocks should be soft enough to scratch with a fingernail. They can also put one rock on the paper and hit it with the other rock.

4. Explain to the students that soil comes from rocks that have been worn away by water, wind, sand, and even sun and rain. We can examine our rocks to see if we can make any soil from them. Tell them to think of how long it took for rocks to wear away to make all the soil we see on our ground outside.

5. Also, tell the children that rubbing rocks together was a way in the past that people made sparks for starting fires. These would be different kinds of rocks.

6. Activity Four. Have the children plant seedlings in the classroom and care for them so they grow throughout the spring.

7. Activity Five. Sprouting birdseed. Ask the children to remember the birdseeds we used to feed the birds in our bird feeders. We are now going to see if we can make some of the seeds grow into little seedlings which can be planted. Distribute a large jar or plastic container and some paper towels. Cut out two or three circles of the paper towels to fit at the bottom of the jar. Put a little water in the container then pour the water out. Drop in different kinds of seeds from the birdseed. Cover the container with a piece of plastic wrap so that towels do not dry out. Note the date and see how long it takes for the seeds to germinate. Children can observe the jar everyday.

8. Activity Six. Making clouds. Ask the children if they wonder what the clouds up in the sky are made of. Tell them we are going to make clouds in the classroom. Set the cup under the ice pan and take the straw to blow into the hot water. Children should see a cloud form when the moist air reaches the cold pie plate. Tell them that clouds form the same way when warm moist air from a lake or ocean rises up and meets cold air in the sky. We see a cloud

of sorts when we blow our breath on a winter day outside when it is very cold. When people talk you can see this cloud coming out of their mouths. Tell children to think about this when winter comes around again.

9. Activity Seven. Plan a trip to Garfield or Lincoln Park Conservatory. Have children dictate an experience chart when they return.

Safety

Be extremely careful when children are using rocks. Safety glasses should be worn at all times. Review the safety rules for outside play activities and for taking trips.

Home Activity/Parent Involvement

Parents will be invited to accompany children on field trips and help with room activities. They will also be asked to help students gather materials for their collections.

Lesson Assessment

At the end of the two weeks, the children will show that they have mastered at least more than half of the specific lesson objectives, and can recite or sing appropriate poems or songs for spring.

Extension Activities

Books to Read

175 Amazing Nature Experiments, by Rosie Harlow and Gareth Morgan, Random House, 1991

Eeny, Meeny, Miney Mole, by Jane Kyolen, Harcourt Brace Jovanovich, 1992.

My First Green Book (A Life-Size Guide for Caring for our Environment), by Angela Welkes, Alfred A. Knopf, 1991.

Additional Activities

Learn spring poems and songs. Children can make drawings and pictures of some of the things they have been doing or from one of the favorite stories they have been listening to.

Work on Nature Museum Table and collections.

Additional Community Resource Excursions

A good place to visit when possible is the Rockome Gardens in Arcola, IL. This trip is not very long and the rock collections and collectibles are terrific.

A Poem for Spring
by Friedricka White

What is Spring?

Rains fall (1)
As insects crawl (2)

Brds sing (1)
As they take wing (2)

Flowers grow (1)
There's no more snow! (2)

As plants turn green (1)
Spring beauty is seen. (2)

Teacher Note:

The children can make appropriate facial expressions and gestures with their arms as they recite the poem.

The class can be divided into two groups. Each group of children can recite one part using the numbered lines.

Lesson 4: Summer

Lesson Introduction

In this lesson, the children will learn, from direct observation and activities, the meaning of the seasonal changes for summer. At the start of each activity for the day, observe the date on the calendar, and check the weather outside.

This will be the last season the children study for the year. Summer usually means long daylight hours and some vacation time away from school. A big holiday to look forward to is the 4th of July.

Families are sometimes getting ready for reunions, picnics or barbecues. A lot of insects are very busy such as mosquitoes, and if you listen in the evenings, you can hear crickets or see fireflies. Some teachers might remember playing in the early evenings of summer and calling the game "catching lightning bugs."

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. tell something about the lives of plants and people in the summer.
3. be able to recognize season changes for summer and note holiday on a calendar.
4. recite summer related poems and sing songs.
5. dictate story for experience chart after participating in simple science activities.
6. know that the summer season follows spring and fall will come next.

Time Allotment

Two weeks will be divided into activities for the summer season. You will have to get started early to have time to complete before school is out. If not finished with the activities, they can be put on sheets for booklets called "My Summer Science Activities" and given to the children to take home. Note: a lot of the summer activities will require more outdoor walks. The activities in this lesson can be completed on different days.

Materials

wide mouth jar
sponge
milk
alcohol
water
aluminum foil
plastic bags
rubber bands

Advanced Preparation

Prepare yourself and your students by reading some of the books suggested at the end of this lesson.

Procedure

Tap Prior Knowledge/Share with Neighbor

1. Activity One. Ask the students to tell you some of the things that make this "summer." After discussion, take a nature walk in the neighborhood. Students will learn the meaning of seasonal changes in summer from direct observations and activities. Tell them that we are starting the summer activities a little early because we will be out of school during the summer. Make a bug jar by using a wide mouth jar with holes punched in the top. Put moist soil and leaves or sticks that insects can crawl on inside. Put a wet sponge with water in it for insects. Cut up some leaves for feeding insects. If you use a large fish tank instead of a jar, it can be covered with wire screening.

Hands-on Activity/Introduce Concept

2. Activity Two. Checking for mold and decay. Take the children for a walk to look for rotting leaves and wood. Ask them to dig up some leaves that have started to decay and see how easily they crumble and break. A rotten log or piece of wood will do the same. Something will rot and get moldy if it gets damp and has no sunlight to dry it out. When this happens to leaves and wood, it turns to rich soil. A tree will eventually rot if it falls on the ground and stays damp.

When bread grows old it forms green or bluish spots on it. This is called mold. Molds feed on dead things causing decay. Tell the children sometimes when basements flood, the belongings (clothing or furniture) may become damp and moldy and be ruined.

3. Activity Three. Evaporation. Explain to the children that we are going to see how fast a small amount of water disappears in the sun. We will try the investigation with milk and with alcohol as well to see which is faster. Put three pieces of foil on the ground in bright sunlight. Put a drop of water on one piece, milk on another, and alcohol on a third. See which drop of liquid evaporates first.

4. Activity Four. A Cooling Experience. Explain to the children that when people play or work hard on a hot summer day they sweat or perspire. This is the moisture coming through the skin to naturally cool the body. The water must evaporate in order to cool you off.

Put a plastic bag on each child's hand and secure with a rubber band. Go outside and run in the school yard or around the school. The hand inside the bag will feel warm and it will sweat but it will not cool off because the water inside cannot evaporate.

When the children come back inside, show them that alcohol evaporates faster than water. Rub some alcohol on one hand of each child and have them wave their hands around. The hand with the alcohol will feel cooler. Children may remember the alcohol rub their parents might have given them when they had a fever. The alcohol cooled them off even when the body was not sweating.

5. Activity Five. Take a trip to Brookfield Zoo or a neighborhood park for outdoor summer picnic with classmates.

Safety

Review the safety rules for outside play activities and for taking trips.

Home Activity/Parent Involvement

What happens when there is no sunlight on grass? Encourage the students to cover a small patch of grass with a board or a brick at home. Check back in a few days to see if there is a difference in the grass. What happens? See if the grass changes again when the board is removed. Explain to the children that the green color in the plant leaves called chlorophyll and it is the chemical that helps make the plant's food. If the grass does not get sunlight, it will lose this color and become almost white.

Lesson Assessment

At the end of the two weeks, the children will show that they have mastered at least more than half of the specific lesson objectives, and can recite or sing appropriate poems or songs for summer.

Extension Activities

Books to Read

175 Amazing Nature Experiments, by Rosie Harlow and Gareth Morgan, Random House, 1991

City in the Summer, by Eleanor Schick, Susan Herschman, 1969.

It's Summertime, by Elaine W. Good, Intercourse, PA: Good Books, 1989.

Rain Drop Splash, by Alvin Tresselt, NY: Lathrop, Lee, and Shepard Co., 1946.

Summer, by Ron Hirschi, NY: Cobblehill Books, 1991.

When Summer Ends, by Susi Gregg Fowler, NY: Greenwillow Books, 1989.

Additional Activities

Have children dictate stories and draw pictures of some of their experiences this week. Have them practice poems or songs of their choice.

Children can make a fan with construction paper. How does a fan help the body to cool?

Students should continue to bring in collections for the Nature Museum Table.

A Poem for Summer
by Friedricka White

What is Summer?

Children play outside, most every day
Swimming, laughing, summer camping.

Bouncing balls and jumping rope
Singing, reading, no time to mope.

When crickets chirp and days grow shorter too,
Summertime is almost through.

Now you know it won't be long
Before "good morning dear teacher"
is our song.

Our Room
A Classroom Song to be Sung Every Day
by Friedricka White

We love our room - we do - we do - we do
We like to read and sing - experiment too
Every day we will come back again
It's really fun to see our friends - our friends - our friends

We have our rules and games that we can play
And when it's time we get to eat each day
Learn more and more our teacher will say - who?
It's you! - you! - you! -woo-oo-woo!

(Point to each other on the "yous" and jump up as in cheerleading on the last
"woo!")

Student Data Sheet Masters

Unit Assessment

Fall

Winter

Spring

Summer

Draw pictures of what you might see on a day during each of these seasons or find a picture from a magazine. Remember what is happening with animals, people, and plants during each of these seasons.

Getting a Grip on Our Garbage

Community Resource Curriculum Development Project

Developed by: Frana Allen

Getting a Grip on Our Garbage

Rationale

This unit is intended to meet the following Instructional Program Objectives for the Illinois State Goals for Learning at the second-grade level:

BIOLOGICAL AND PHYSICAL SCIENCES

Use appropriate scientific vocabulary.

Follow directions to complete a simple experiment.

Gather, report, and compare data from a simple experiment.

Recognize science-related careers and avocations.

SOCIAL SCIENCES

Recognize the need for conservation of natural resources in our communities.

MATHEMATICS

Measure lengths to the nearest inch, foot, yard, centimeter, and meter.

Collect, record and interpret data.

Use mathematics in other curriculum areas.

Content Background

The growing concern that faces all of society is our environment's garbage. Chicago has been working very hard since 1987 to put into place a recycling program called the Solid Waste Planning and Recycling Act of Illinois. This Act states that counties and the City of Chicago have a direct responsibility for the management of municipal waste within their boundaries, and the timely development and maintenance of necessary waste management facilities and programs.

In the spring of 1992, Chicago's City Council passed a twenty-year Solid Waste Management Plan which lays the blueprint for comprehensive approach to handling waste in the City. They are: 1) Blue Bag Recycling Program; 2) Big Building Recycling Program; 3) City Sort; 4) Drop Box Recycling Program; 5) Buy Back Centers; and 6) Special Items Recycling Programs.

Timeline for Unit

This unit consists of six 40-minute lessons. It was not developed for a specific time of the year.

Evaluation/Assessment

Using higher-order thinking skills, children will express opinions and report on the importance or necessity of protecting our environment. Given the opportunity as individuals or as members of a cooperative group, children can display their understanding of the unit's concepts in a variety of activities following each lesson. They can decide what actions they will take to help the environment. For example, they can use garbage to make planters, then plant seeds and flowers, then make compost for the plants. Data sheets will be completed by the students and collected for a review. Oral reports and constructed models will also be used for assessment. Portfolios will be kept to showcase student work and will be evaluated by both student and teacher.

Resources

Let's Recycle (coloring book item #56648E-4-94)
Commonwealth Edison
800-628-7733

Community Recycle Center
Champaign, IL

Intergovernmental Solid Waste Disposal Commission
Urbana, IL

Kohl's Children's Museum
visit the recycling exhibit

Teaching Science With Garbage
Albert and Vivian Schatz
Emmaus, PA: Rodale Press, Inc., 1971.

University of Illinois Cooperative Extension Service
Mrs. Johnson, Recycling
5106 South Western
Chicago, IL 60609

Glossary

ABIOTIC SUBSTANCES: substances such as water and phosphorous to sustain life

ABSORBENT: able to take moisture

AEROBIC: a biochemical process or condition occurring in the presence of oxygen

ANAEROBIC: living, active, or occurring in the absence of free oxygen

BIODEGRADABLE: able to decay

COMPOST: natural fertilizer made from waste, used to help gardens grow

CONSERVATION: careful use of something especially a natural resource to help save the earth and its resources

DECOMPOSE: breakdown or rot
environment: all of the surroundings of living things

LANDFILL: location where garbage and trash are disposed of by burying and covering with soil

METHANE: a colorless odorless, flammable, and potentially dangerous gaseous hydrocarbon present in natural gas, and formed by the decomposition of organic matter; can be used as fuel.

ORGANIC: living matter

POLLUTION: harmful substances deposited in the air, water, or land that cause a dirty, unhealthy, or hazardous condition

RECYCLE: to separate a given material from waste and process it so that it can be used again in a form similar to its original use

REUSE: finding new functions for objects and materials that have outgrown their original use; to use again

SOLID WASTE: any of a wide variety of solid materials which are discarded or rejected as being soiled, useless, worthless

WASTE: anything that is discarded, useless, or unwanted

LESSON 1: School Trash With A Flash

Lesson Introduction

One Chicagoan generates an average of five pounds of garbage per day. This comes to four million tons per year. Recycling is one of the six components the City of Chicago uses to control some of Chicago's waste.

Specific Lesson Objectives

The students will:

1. understand the definition of recycling.
2. be able to identify that materials that are recycled in the City of Chicago and those that are not recycled.

Time Allotment

one 60-minute session

Materials

a trash can or prepared large garbage bag containing the following:

1. two aluminum soda-pop cans
 2. two/three glass bottles or jars
 3. plastic containers
 4. newspaper
 5. telephone directory
 6. leaves, grass clippings, tree branches
 7. rubber
 8. or any other items that have a recycling symbol on them
- two large laminated sheets of paper, one showing the Recycling Symbol and the other a Garbage Can

Advanced Preparation

Collect the items mentioned above.

Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge

1. Show the students the recycling symbol. Ask them, "What does this sign mean? What kind of items can be recycled and which ones can't?"

Share with Neighbor

2. Have the students discuss in their groups why it is important to recycle?

Hands-on Activity

3. Have the students make a circle. Choose some students and have them take turns putting their hands in the bag and pulling out one item. (All of the students may want to participate all at once. Explain to them that during

these activities, they will take turns and that everyone will get a chance.) Have them place the item under the correct symbol.

Introduce Principle/Concept

4. Compare and contrast the observations made by students. Explain that consumers and manufacturers are becoming more aware of protecting and preserving our environment. More and more manufacturers are putting recycling symbols on the products. Consumers are becoming more educated to Chicago's recycling program and therefore are buying products more wisely.

Relate Activity and Concept

5. Show the students several items that have the recycling symbol. Then show several items that cannot be recycled, and ask the students, "Can some of these items be used for something else?" (Examples include a butter tub, frozen dinner trays, yogurt containers, etc.)

Home Activity/Parent Involvement

If possible, have the students and their parents go shopping together and look for items that have the recycling symbol. Students with the help of their parents are to write down at least five items they find.

Lesson Assessment

Teacher and students write a story on garbage. Students will draw a picture of what they learned.

Home Activity/Parent Involvement

Have the students ask their parents and or neighbors for any items that have a recycling symbol on them.

Extension Activities

Books to Read

Scholastic Magazine, Big Book, Garbage, 1991.

This lesson adapted from The City of Chicago, Department of Environment, Solid Waste Curriculum, 1993.



LESSON 2: What's In Our Trash?

Lesson Introduction

The amount of garbage generated in the Chicago City of Chicago averages out to five pounds per pounds per person per day. This comes to four millions tons per year. Handling this much garbage requires that we use all the waste management methods available to us. There are six components to the City of Chicago's Solid Waste Management Plan: 1) source reduction; 2) recycling; 3) reusing; 4) composting; 5) energy recovery; and 6) disposal into landfill facilities. Everything that we throw away has to go somewhere after we put it in our garbage cans. The City of Chicago hires waste haulers and they take this to landfills where it is buried under soil.

Specific Lesson Objectives

The students will:

1. understand that when we throw away everything we create a lot of garbage.
2. be able to identify the types of garbage that go into the City of Chicago's landfills.

Time Allotment

one 60-minute session

Materials

a very large cardboard circle marked in sections to show the amounts of garbage that fall into Chicago's solid waste category

Paper 26%
Yard Waste 18%
Plastic 9%
Metal 7%
Glass 6%
Wood 4%
Food 13%
Bulky Waste 7%
Other 10%

glue

scissors

red marker or red food coloring to symbolize sauce

paper (clean paper and cardboard only/newspapers can include inserts, and should be tied or just dumped into containers (no grocery bags)

yard waste (twigs, cut grass, dried leaves)

food waste (dried pasta, dry cereal or any item that will not rot or create an odor)

metals (aluminum foil, nails screws, pop top tabs)

glass (safety glass from the auto window repair shop)

(NOTE: Use magazine to obtain items that show glass)

plastic (there are seven different plastic resins. The resin code is imprinted on the bottom of the container and is surrounded by a triangle made of chasing arrows. Recycle only what is requested at the recycling station in your area. Remove lids since they are usually a different type plastic.)
wood (lumber, tongue depressors, popsicle sticks, etc.)
bulky waste (refrigerators, mattresses, stoves, etc. these examples can be small toys or magazine pictures)
other (rubber textiles)

Advanced Preparation

Prepare nine slices that are proportional to the amount of waste that is used by the majority of people in the Chicago area. Collect clean garbage and place them in individual bags.

Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge

1. Ask students "What kind of garbage do you think people throw away? What kind of garbage is thrown away the most? What is the hardest garbage to get rid of?" Elicit all responses and discuss.

Share with Neighbor

2. Have students draw three picture of different kinds of garbage? Share them with each other.

Hands-on Activity

3. Give each group of students a bag, a portion of the pizza, glue, and food coloring. Put all the pieces together.

Introduce Principle/Concept

4. Ask the students the following questions: "What is the largest portion of the pizza? What is the smallest? How can people reduce each of these portions?"

Relate Activity and Concept

5. Have students discuss what they learned from Lesson 1 and discuss the changes being made in the recycling arena. To name just a few:

yard waste....returned to the earth

paper....reused again

Styrofoam....not being made anymore unless it can decompose faster

Home Activity/Parent Involvement

What kind of things are recycled in their homes? Invite students to make a list.

Use the Student Waste Management Plan like this:

Student Waste Management Plan

Source Reduction	Recycling	Reusing	Composting	Energy Recovery	Disposal into Landfill

Lesson Assessment

With the help of the teacher, students will write and draw a brief story about the recycling symbol and garbage. The lead question is "Why is the recycling symbol so important to the consumer?" Have the students make a list of ideas that will enable the consumer to be a better shopper and waste reducer. These stories should be placed in their journals.

Extension Activities

Using magazines, have the students make a garbage collage.
Mobius Fun Book, 1-800-BFI-8100.

This lesson adapted from The City of Chicago, Department of Environment, Solid Waste Curriculum, 1993.

LESSON 3: Compost: Handle With Care or Hey! It's Compost Time!

Lesson Introduction

Most of our household garbage could be used again. Waste such as coffee grounds, potato peels and other vegetable scraps will decay in time and can be turned into compost. This is a natural fertilizer for garden plants. Also, another very important fertilizer is yard waste. Yard waste includes grass, flowers, weeds, leaves, tree branches, etc. Composting is the natural way of recycling our discarded natural waste-- putting back into the earth the nutrients that were taken out. This process is called composting.

Specific Lesson Objectives

The students will:

1. be able to identify and use words related to Chicago's composting program.
2. be able to understand that decomposition is the process which takes place during composting.

Time Allotment

This lesson can be divided into two 60-minute sessions

Materials

organic waste
yard waste
clear plastic cups
balloons
rubber bands
tape measure
journals
pencils or pens

Advanced Preparation

Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge

1. Tell the students that they will create an environment in which the decomposition process can take place. What do they think will happen?

Share with Neighbor

2. Have the students write a short entry in their journals and share with the others in the group.

Hands-on Activity

3. Begin with two plastic cups. Instruct the students to put half of their compost material in cup #1. Cover this cup with a balloon. REMEMBER: the

balloon is not blown up. In cup #2, place the remaining compost material mixed with the soil. This cup is also covered with a balloon.

Introduce Principle/Concept

4. Watch the change in the balloons. Each group will maintain its own project. Each will be assigned conditions/an area to place the project. Different areas and conditions make observations more interesting. Some conditions/areas are: moist and warm, dry and cool, sunny and dry, moist and dark, sun-light vs. grow lamp.

REMEMBER: EACH CONDITION HAS TWO JARS: ONE WITH COMPOST AND SOIL AND THE OTHER WITH JUST COMPOST.

5. Instruct the students to record growth of the balloons in centimeters using a tape measure. They will maintain an observation journal on a daily basis. Before beginning observations, encourage the students to make predictions about what will happen in each of the conditions.

Relate Activity and Concept

6. Compare the conditions of the various jars and discuss the observations.

Home Activity/Parent Involvement

Under their parents supervision, students can do the same experiment at home. Using soil and compost, they can find out which material decomposes faster in the sunlight. They will need a Ziploc bag, cotton fiber, small piece of green pepper, a piece of newspaper, coffee grounds, and/or a cracker. Students should choose two or three of the items. After three weeks, they can see which one decomposed the fastest. Students should make their predictions first.

Lesson Assessment

Have each group report to the group their findings after three or four days. Then again after a month. Students should be able to tell the rest of the class if their groups predictions were accurate.

Extension Activities/Resources

Illinois Department of Energy and Natural Resources
Office of Recycling and Waste Reduction
Springfield, IL 62704-1892
1-800-252-8955

At the close of this lesson, have students use the data in their observation journals to create visual representations of the results.

This lesson adapted from The City of Chicago, Department of Environment, Solid Waste Curriculum, 1993.

LESSON 4: Land of Not so Plenty

Lesson Introduction

In this lesson, the students will learn that land is not as plentiful as one thinks. Landfills across the United States are being filled up.

There was a time when all wastes were dumped into dumps and then, later into landfills, but, because of the hazards to our earth, air and water supply, it is necessary to monitor what we put into our landfills. Landfills are land areas roughly as large as the new Chicago Stadium lined with either a thick plastic liner or clay to keep the leachate-- a liquid from garbage, decomposed waste, and bacteria-- from contaminating ground water and harming vegetation.

Landfills also have waste that biodegrades or decomposes extremely slowly and therefore gives off various gases. These gases are known as methane and carbon dioxide. Of these gases, methane is the most dangerous because it is much lighter than air and therefore will rise to the top of a landfill. This gas needs to escape and therefore pipelines are constructed to allow this to happen. Connected to each pipeline is a meter which monitors the gas being released into the atmosphere.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. record and compare results of experiments.
3. acquaint students with the construction of a landfill.
4. become familiar with vocabulary associated with landfills.

Time Allotment

This lesson can be divided into two 60-minute sessions

Materials

small box (can be a jewelry box, a small lid can be off of a Quaker oats box)
plastic bag
grass seeds
plastic or clay
potato
carrot
old newspaper
spray bottle
a tooth pick
scissors
soil
straw
journals
pencil

Advanced Preparation

Collect small boxes, or even milk cartons, plastic bags from the local market, clay if available, and newspapers. Purchase grass seeds from the local nursery store. Thinly slice carrots and/or potatoes, soil, and straw. Duplicate journals, graphs, charts and table. Arrange the students into cooperative groups.

Procedure**Tap Prior Knowledge**

1. Ask the students "Why do you think people line a landfill? How long will it take for certain food items to decompose in a landfill?"

Share with Neighbor

2. Have the students write a short entry in their journals and share with others in the group.

Hands-on Activity

3. Give each group a box, plastic or clay, carrot and or potato pieces, and soil.
4. Have the students line the box with either plastic or clay, cover box half way with soil, lay a few slices of carrots and/or potatoes on the soil, then cover the food with soil all the way to the top. Place a straw in it.

Introduce Principle/Concept

5. There are several things that are going on. The breaking down of the food is called decomposition. Biodegradable items can be broken down in the environment by bacteria. Plastic or clay is used for lining because it prevents leaks and holds moisture. The straw represents the pipes that allow the methane gas to escape.
6. After two weeks, take a tooth pick and find the food planted has decomposed in the landfill. Option: you can cover the landfill completely in plastic to speed up decomposition process and to keep smell and insect involvement at a minimum.

Relate Activity and Concept

7. In their journals, have the students make note about the things can be reduced, recycled and reused, and also items that cannot. "What types of items do you see that are biodegradable as you ride or walk to school?"
8. Review important vocabulary from the glossary and discuss the importance of landfills vs. dumps. Give the students some time to write a journal entry. Each group should develop a paragraph describing ways consumers can reduce the amount of garbage that goes into a landfill.

Home Activity/Parent Involvement

If students can find an elderly person (80-85 years of age or so), have them ask how they got rid of their garbage and where it went. Share these responses with the class.

Lesson Assessment

Collect each group's paragraph describing the ways consumers can reduce the amount of garbage that goes into a landfill.

This lesson adapted from The City of Chicago, Department of Environment, Solid Waste Curriculum, 1993.

Unit Assessment

Develop a recycling system at your school. Use recycled items to make art objects (pictures, jewelry, etc.) to sell or display around the school. Teachers and students can use these containers as organizers in the classroom. Draw pictures to show the waste disposal process, polluted air and water.

Criteria	<u>Outstanding</u>	<u>Satisfactory</u>	<u>Unacceptable</u>
Effective Teamwork	Everyone is active in the process by contributing, sharing materials and respecting the working areas of others	Some team members are able to contribute, share, respect the working areas of others	No team members are able to contribute, share, or respect the working areas of others
Description of Experiment	Complete record of the procedure, including finished product and correctly completed worksheet	complete record of the procedure but unclear or inaccurate and worksheet sketchy	incomplete record of the procedure with entire sections missing
Product Hands-on Activity	product is done and is both complete and accurate	product is done but not accurate	product is not done completely or accurately
Questions and Answers	demonstrates a knowledge of recycling by three questions	answers two of three questions correctly	answers less than two of three questions correctly

**Animals, Animals Everywhere:
Land, Sea, and Air**

Community Resource Curriculum Development Project

Developed by: Sharon Gill
Joyce Grey
Kaye Moriarty

Animals, Animals Everywhere: Land, Sea, and Air

Rationale

This unit is intended to meet the following Instructional Program Objectives for the Illinois State Goals for Learning at the first-grade level:

BIOLOGICAL AND PHYSICAL SCIENCES

Use appropriate scientific vocabulary.
Recognize animals and animal groups.
Identify body parts of animals.
Build an understanding of animal habitats.
Recognize the continent of North America.
Classify air and sea animals.

SOCIAL STUDIES

Recognize the need to conserve our national resources.
Identify the United States on a map of the world.

MATHEMATICS

Count and record animals through visual observations.
Graph data after visual observation on a simple graph.
Understand the concept of greater and less than.

Content Background

Animals come in many shapes and sizes and live in all parts of the world. They walk, crawl, hop and run on land. They fly in the air and they swim in water. The world has so many animals that no one can count them. No one knows how many species of animals there are in the world.

Animals live everywhere, in all climates, on land and at all levels of the oceans. Many kinds of animals often live in the same place. They have lived in these places for thousands of years, and their bodies and ways of life have evolved to suit them in those surroundings. During this unit of study, allow your students to become actively involved in their learning. If possible, invite them to bring in pictures of their pets, and always allow them a chance to share what they know about animals with the class.

Mammals are vertebrates, animals with backbones, but so are fishes, amphibians, reptiles, and birds. All mammals have lungs and breathe air. All mammals maintain a fairly constant body temperature, in spite of the temperature outside. All mammals except the platypus and the spiny anteater give birth to their young alive.

Animals that are mammals can be recognized by children because most mammals have hair or fur. Mammals differ from all other animals in that they take care and protect their young, both before and after birth. Other less obvious characteristics are that their lungs and heart are separated from the stomach and intestinal tract by a diaphragm. The lower jaw is made of a single bone on each side, and their bodies produce milk to feed their young. Most mammals have several different kinds of teeth for cutting, tearing, and grinding.

Mammals are the dominant of ruling class of animals because of their superior brains, warm blood, and improved methods of caring for their young, which gives them advantages for food gathering, mating, and defending themselves. On the first-grade level, a simple definition for mammals is animals with hair or fur who nurse their young, and care for them until they can survive on their own.

Birds are the only animals with feathers. All birds have feathers, and all birds have wings. However, not all birds can fly. The wings of all birds serve a purpose. The feathers of birds are not only used for flying, but for insulation as well.

Birds move in many different ways. When birds fly the inner part of the wing moves up and down, while the outer part of the wing moves in a circular pattern. The wing tip moves forward on the downstroke. This action pushes the bird through the air. Most birds have hollow bones and powerful muscles that allow them to fly. Flightless birds use their wings to balance themselves as they walk, hop, climb, or run. Some flightless birds use their wings like flippers to help propel them through water. Kiwi, ostrich, penguin and emu are examples of flightless birds.

Birds have no teeth. Their beaks and feet (clawed, webbed, etc.) determine their diets in most cases. They find food in many places...in the air, on the ground, underwater, inside flowers, trees and mud. Their diets include insects, fish, meat, seeds, fruits and sap. Their unique digestive systems allow them to swallow large pieces of food. Some birds swallow their food whole. In a number of regions of the world, food becomes scarce during certain seasons of the year. During unfavorable seasons, birds sometimes starve to death in those regions. Therefore the majority of birds that nest in these regions migrate to warmer climates in the fall, then return in the spring.

The majority of the earth is covered by water...ponds, swamps, lakes, rivers, streams and oceans. In nearly all of them, there are fish! There are more than twenty thousand kinds of fish in the world.

The smallest fish is the pygmy goby, which is the size of the nail on your big toe. The largest fish is the whale shark, which can grow to be as long as three

school buses. Fish can be long, thin, fat, or round. They may be a muddy brown, or gray, or they may be brightly colored. But no matter what they look like, or what color they are, they all have three things in common.

- 1) They have a skeleton with a backbone. Shellfish, such as lobster, crab, and clam, are NOT fish, because they have outside shells instead of internal backbones.
- 2) All fish have gills that let them breathe in the water. Whales and dolphins are not fish, because they have lungs instead of gills.
- 3) Fish are cold-blooded. Their body temperature is about the same as the temperature of the water they swim in.

Most fish live in water all the time. However, a few like the mudskipper, spend a part of their time out of the water. All fish breathe with the aid of gills. But, a few, like the lungfish, also use lungs to take in air. Most fish have scaly skins, but some like certain eels, and the sea horse have no scales.

Fish find their food in the water. The teeth are suited to the foods they eat. Some fish eat only animals, such as insects, worms, shellfish, and other fish. Some eat only plants such as seaweed, others eat both plants and animals. All fish can smell, hear sounds. Fish have no outside ears, they feel sound vibrations that travel through the water.

Timeline for Unit

This unit is divided into approximately twelve 20-minute sessions, and can be taught over the course of a few weeks. It is suggested that this unit be taught in the spring of the year.

Evaluation/ Assessment

Using higher order thinking skills, children will express opinions and report on the importance or necessity of protecting our environment. Given the opportunity as individuals or as members of a cooperative group, students can display their understanding of the units concepts in a variety of activities following each lesson. Portfolios will be kept to showcase students' work and will be evaluated by teacher.

Community Resources

Brookfield Zoo
3300 South Golf
Brookfield, IL 60513
(708) 485-0263 x360

Chicago Academy of Sciences
2001 North Clark Street
Chicago, IL 60614
(312) 549-0606

Lincoln Park Zoo
2200 North Cannon Drive
Chicago, IL 60614
(312) 294-4649

Shedd Aquarium
1200 South Lake Shore Drive
Chicago, IL 60605
(312) 939-2420

US Fish and Wild Life Service
Rosemont, IL 60018
(708) 298-3250

Willowbrook Wild Life Haven
525 South Park Boulevard
Glen Ellyn, IL
(708) 790-4913

Career Connections

The careers available in the study of zoology include farmer, marine biologist, animal nutritionist, zoo keeper, veterinarian, and game warden.

Glossary

BEAK: the mouth of a bird

BIRD: a warm blooded animal with wings and feathers

CLAW: a sharp, usually slender and curved nail on the toe of an animal

COLD-BLOODED: an animal whose body temperature is not internally regulated, but approximating that of the environment

CONTINENT: any of the seven largest land areas

EXTINCT: this happens when all members of a species have died: the most famous example is the dinosaur

FINS: part of fish used for swimming: fins help fish to change directions

FISH: a cold-blooded animal that lives in the water and has gills for breathing, fins, and usually scales

GILLS: part of fish located on either side of the head that removes oxygen from the water

HABITAT: the place where an animal or plant naturally live

INSECT: small animal without a backbone, three body parts, six legs, and usually four wings

MAMMAL: warm-blooded animal that usually has hair or fur and produces milk for its babies

SCALES: small flattened rigid skin that covers fish

SUCKLE: to give milk from the breast, or udder

TAIL: the back part of the body of a fish that help them to navigate through water

VERTEBRATE: animals having a spinal column

WEB-FOOT: an animal whose tissue of membrane of its feet are joined as one unit

LESSON 1: Mammals Make Milk

Lesson Introduction

In this lesson, the students will learn about mammals and what makes an animal a mammal. The children will begin to identify various mammals, birds, and insects in their neighborhood.

Specific Lesson Objectives

The students will:

1. use appropriate scientific language.
2. identify mammals as warm blooded animals that produce milk to feed their young, and they usually have hair or fur.
3. count and identify mammals.
4. learn to make a bar graph.

Time Allotment

three 20-minute sessions

Materials

crayons
transparency of "Neighborhood Animals" bar graph
magnetic strips
copies of student data sheets
pencils

Advanced Preparation

Collect animal pictures to represent mammals, fish and birds. Duplicate data sheets. Arrange the students into partners.

Procedure

Tap Prior Knowledge

1. Ask students to name animals that they have seen in their neighborhood, city, and zoos.

Share with Neighbor

2. Explain that we will group these animals into mammals, birds, and fish. Have the students select pictures and then paste with a magnetic strip on the back and place on blackboard under one of the headings: mammals, birds, fish.
3. Name the animal, help them identify why it is a mammal, bird or fish.
4. Pass out "Color the Mammals" (data sheet 1.1) and identify the mammals with the children. Have them note that there is one fish and one bird that should not be colored.

Hands-on Activity

5. Pass out "Neighborhood Animals" (data sheet 1.2) and clip boards, if possible, to each set of partners. Review the groups and their characteristics.
6. Walk around the neighborhood observing and counting.
7. The next day, have the partners add up the animals they counted yesterday.
8. With an overhead and the transparency of "Neighborhood Animals Bar Graph" (data sheet 1.3) show the students how to make a bar graph from data sheet 1.2.
9. Color the graph

Introduce Principle/Concept

10. Review the characteristics of mammals, birds, and insects.
11. Have the children talk about their pets and point out that cats and dogs feel warm when they hold them because they are warm-blooded. Help them observe that people feel warm when they are held because we are mammals, too.

Home Activity/Parent Involvement

Have students cut out pictures of mammals and paste them on a page labeled mammals. Have them name the animals and list the three characteristics of mammals with their parents.

Have the students ask their parents if they can name a mammal without hair.

Student Data Sheet Masters

Color the Mammals

Neighborhood Animals

Neighborhood Animals Bar Graph

Lesson Assessment

Collect the students data sheets and save them for their portfolios. Note the students participation.

Extension Activities

Have the children cut out a mammal and write words that describe the animal. Word Bank:

runs	brown	blends into	habitat
hops	black	fur	jumps
white	4 legs	climbs	gray
red	tail	warm-blooded	

LESSON 2: Birds and Beaks

Lesson Introduction

In this lesson, students will describe the physical characteristics of birds. They will understand how some characteristics, such as the shape and size of the bird's beak, affect its diet. Students will describe/define a bird as any animal with feathers.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. describe birds.
3. based on simulated observation make inference that describes how some birds use their beaks to feed.

Time Allotment

five 20-minute sessions

Materials

several pictures of birds with different physical characteristics (beaks and feet)
scissors
straws
nut cracker
small liquid strainer
paper cups, and snack plates
gummy worms and fish
dried fruit snack (Fruit Roll ups)
blueberry flavored soft drink
peanuts with shells
balloons (assorted colors)
construction paper (assorted colors)
empty (clean) meat trays
data sheets and graphs
ice chips

Advanced Preparation

Gather materials. Prepare soft drink in advance. Set-up trays and snack plates with items mentioned below. Duplicate data sheets.

Prior to this lesson, have a picture of a bird drawn on the chalk board, or poster board. The model should be large enough for the entire class to see.

Procedure

Tap Prior Knowledge

1. Ask students "What is a bird?" "What do birds look like?" Encourage discussion about birds similarities and differences. "Do birds have babies?" "How do birds have babies?" Encourage talk between students, pointing out how birds are not born alive, but hatched from eggs.

Share with Neighbor

2. Give students the opportunity to help you label the body parts of a bird that they recognize. Discuss with them how birds use these body parts. Give students the scientific names for birds body parts that are unfamiliar to them. Label each part on the large model.

3. Post several pictures of birds with different characteristics (color, beak, feet, size). Make a game of it! Group students in teams of four. Students should identify characteristics of birds that are different. Students should discuss with team members the characteristics that they see that are not the same, as well as the characteristics that each bird shares. Teacher should encourage discussion. The classroom might become noisy, but remember that the children are learning. Groups should share with the class their findings. Teacher can then expound on students' observations, and/or correct inferences made by students. Students should complete "Label the Bird" (data sheet 2.1).

Hands-on Activity

4. Give each student one blown up balloon, and pictures of a beak, wings, feet, and tail of different birds on "Bird Body Parts" (data sheet 2.2). Student should color these parts, cut them out, then glue pieces to the balloon. Students will have created a imaginative representation of a bird.

5. Group students in groups of two. Distribute trays to students (tray should contain scissors, straw, a strainer and nut cracker). Ask "What do you think these items might have in common with the beaks of some birds?"

Encourage responses. Distribute snack plates with fruit square and shelled peanut. Distribute cups filled with soft drink and ice chips. Can you use the items on your tray with the food items I've to given you? Ask "How do you think birds use their beaks to eat?"

6. Demonstrate how wading, swimming and diving birds get food from water. Demonstrate how birds use their beaks to separate/strain sand and other tiny objects from its food. Use the blueberry soft drink, filled with ice chips, gummy fish and worms to illustrate how most water birds get their food and use their beaks. Point out that these birds often swallow their food whole, because they have no teeth. Explain that birds are able to swallow

large pieces, or whole animals (fish) because of their unique digestive system. Complete "Bird Bills" (data sheets 2.3 and 2.4).

7. Read to students *Heather's Feathers*, by Leatie Weiss

8. Give students construction paper and crayons and invite them to draw their favorite bird, eating its favorite food.

Introduce Principle/Concept

9. Help the students see that the shape of a bird's beak sometimes determines what and how it eats. Birds use their beaks to tear, crack, pierce, and suck food. Their beaks can also act as strainers to separate water, sand, and other small objects from food. Birds have no teeth.

Related Activity and Concept

10. Show them a poster of birds found in Illinois and the United States, and have them identify bird beaks, and how they are used. Students can collect data on bird beaks, then graph their findings.

Safety

Students should be discouraged from using scissors as weapons, or from cutting objects other than paper.

Home Activity/Parent Involvement

Students should observe birds in their neighborhoods. Students should try to determine base of their knowledge of how birds use their beaks, how the birds that they observe use their beaks to feed. Parents should help students identify birds by name.

Student Data Sheet Masters

Label the Bird

Bird Body Parts

Bird Bills

Bird Bills II

Lesson Assessment

Collect drawings, graphs, worksheets, and data sheets to evaluate students comprehension of lesson on birds. Keep drawings in student's portfolio. Note students' participation in class discussions.

Extension Activities

From Egg to Chicken video...SVE Life Science Patterns

Life In a Bird's Nest film strip... Society For Visual Education, Inc.

Conservation Education Today and Tomorrow Audio & Visual Kit

Illinois Birds, Illinois Department of Conservation

Wonders of Learning Kit -Birds and How they Grow, National Geographic

LESSON 3: Adopt a Fish

Lesson Introduction

In this activity students will make visual observations of fish swimming in their classroom aquarium. They will focus on one fish or "adopt a fish" and scrutinize its behavior.

Specific Lesson Objectives

The student will:

1. use appropriate scientific vocabulary.
2. use a simple device to measure length.
3. demonstrate that an inference can be made from direct observation.
4. collect and record observations over a period of time.

Time Allotment

four 20-minute sessions, plus time to observe fish in the classroom aquarium

Materials

classroom aquarium
crayons
rulers
blueberry gelatin
candy gummy fish
plastic clear cups
copies of student data worksheets
pencils or pens

Advanced Preparation

Set up classroom aquarium. Purchase gelatin, candy fish and cups.
Duplicate data sheets.

Procedure

Tap Prior Knowledge

1. Ask students "What is a fish?" Elicit from the class different kinds of fish they know, or have seen. Make a list on the board.

Examples that might encourage discussion :

Angler Fish live at the bottom of the sea. Their bodies are covered with small flaps of skin and their skin color is very dull. They look like seaweed. They catch smaller fish by remaining very still until they see smaller fish which they lure by waving a red flap of skin on their noses which the smaller fish thinks is a worm. Next, the angler opens its huge mouth and sucks the little fish inside.

Mudskippers are tree climbing fish found in West Africa. They have suckers on their fins which they use to climb the trunks of Mangrove trees. They live in swamps and can breathe air. They spend most of their time out of the water, but must return to the water often to get wet. They also carry extra water in their gills.

The Walking Catfish is a fish that walks or crawls on its front fins. It uses tail to push itself along the ground. This fish is different from the majority of fish because it can breathe air. It rest during the day and comes out at night. It will eat almost anything. It is always looking for a better home (pond). It has been spotted crossing a highway to get to the best pond.

Archer fish shoot down insects that live near the banks of streams and ponds. When an Archer sees an insect it raises its mouth close to the surface of the water. Then it squirts a spray of water. The water drop hits the insect, and it falls into the water.

Share with Neighbor

2. Work in groups of four and discuss the fish that the students adopted with their neighbors. Use "Adopt a Fish" (data sheet 3.1). Select one child from each group to read the data from his/her data sheet.

Hands-on Activity

3. Have students measure their adopted fish with a centimeter ruler. Have them write down the data, then record it on a simple bar graph. Measure four other fish then graph their lengths on a simple bar graph. Use "Fish Graph" (data sheet 3.2) as a sample.

Introduce Principle/Concept

4. Introduce the concept of habitat to the class. A habitat is a place where an animal makes it home. The habitat for fish is the water.

Relate Activity and Concept

5. Why did we spend time observing the fish in the aquarium? We wanted to see how the fish moves, eats, hides, and lives in its habitat, which is the water.

Connect To Other Everyday Examples

6. Every living things lives in a habitat- a place where it can find food, water, and shelter to help it survive. Discuss our own habitats and talk about what human beings need to survive.

Home Activity/Parent Involvement

Letters can be sent home requesting parents to purchase one or two goldfish so that each student can set up an aquarium. They will get first-hand

experience in taking care of the fish. Children will keep a journal and write down or draw their observations.

Summary

As a summary of this lesson, have each student create a little aquarium in a cup using blueberry gelatin and candy gummy fish.

Student Data Sheet Masters

Adopt a Fish

Fish Graph

Identify the Fish

Lesson Assessment

Give the students "Identify the Fish" (data sheet 3.3). They are to color only the fish. Next, they are to draw a habitat for the fish. Next, they are to draw a habitat for the fish they have colored.

LESSON 4: Parts of a Fish

Lesson Introduction

Children will understand that fish all have three things in common: all have a skeleton with a backbone, all have gills that let them breathe in the water, and all are cold-blooded. Most fish have fins which they use for swimming. Most fish are covered with scales which are small hard pieces of skin. Most fish have a tail to help them navigate through the water.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. demonstrate that an inference can be made from direct observation.

Time Allotment

four 20-minute sessions.

Materials

poster showing fish and its parts
6 big fish from fish market
ink
rulers
construction paper
balloon
water
Vaseline or oil
copies of student data sheets
pencils or pens

Advanced Preparation

Duplicate data sheets.

Procedure

Tap Prior Knowledge

1. Hold up a poster of fish and allow students to discuss what they see. Point out tail, fins, gills, and scales. Have them write an experience story on the board from suggestions from the class. For example, "My name is Freddy Fish. I live in the water. I breathe air because I have gills on either side of my head. I use my fins and tail to help me swim and change directions. I have scales all over my body."

Share with Neighbor

2. Give the students "Missing Parts" (data sheet 4.1) and let them complete it together. The fish on this sheets have either a missing tail, or fin, or scales, or gills. Have them work with a neighbor to identify the part and draw it on the fish.

Hands-on Activity

3. Divide into cooperative groups. Give each group a large fish and a chance to examine it, measure it, and locate the main body parts. While examining the large fish, have them answer these questions orally in class.

- a. What is the size and shape of the fish?
- b. Find the gills, scales, fins, and tail.
- c. What are these parts used for?
- d. What color is the fish?
- e. How does the fish smell?
- f. How are fish useful to humans?
- g. What can hurt a fish?

4. Show them how to dip the fish in ink and make prints on construction paper.

Introduce Principle/Concept

5. Review the scientific vocabulary of the parts of a fish. Review the concept of cold-blooded, and how the temperature of a fish adapts to its environment. Children will simulate how a fish feels. Fill a balloon with cold water. How does it feel to the touch? Next, cover the balloon with Vaseline, oil, or something to make the balloon slippery. Rub with hands, until the balloon becomes warm like the temperature of your hand.

Relate Activity and Concept

6. Discuss how each body part helps the fish to survive.

Connect To Other Everyday Examples

7. Each part of the fish has a job as we have seen in this lesson. Explore with children how each part of an animal has a job and each part of a human being has a job as well.

Home Activity/Parent Involvement

Have students use pictures of fish from magazines they have at home. Students will cut out pictures of fish, then glue the pictures to construction paper squares. Using string, they will attach the fish squares to a coat hanger to create a fish mobile.

Student Data Sheet Masters

Missing Parts

Label the Parts

Lesson Assessment

Give the students "Label the Parts" (data sheet 4.2) and have them label the tail, fins, gills, and scales. As a summary to this lesson, have each child write a short story telling what would happen to a fish if one of its parts were missing. For example, what if a fish had no gills? As a culminating activity, take a trip to the Shedd Aquarium or Lincoln Park Zoo.

Unit Assessment

Mammals

Draw a picture of your favorite mammal here.

List some characteristics that make this animal a mammal.

Birds

Draw a picture of your favorite bird here.

List some characteristics that make this animal a bird.

Fish

Draw a picture of your favorite fish here.

List some characteristics that make this animal a fish.

Criterion: Recognition of mammals bird, or fish: choosing appropriate example

points	behavior
given	

On a worksheet, the student:

- 3 offers a correct example of a mammal, bird or fish
- 2 offers example(s), but not of all three
- 1 does not offer example of mammals, birds, or fish

Criterion: Recognition of mammals bird, or fish: listing characteristics

points	behavior
given	

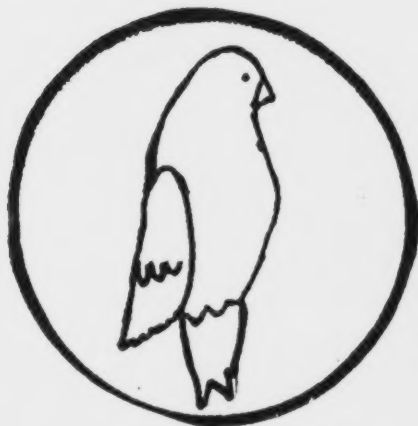
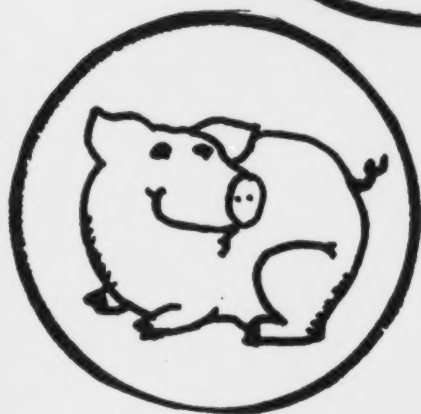
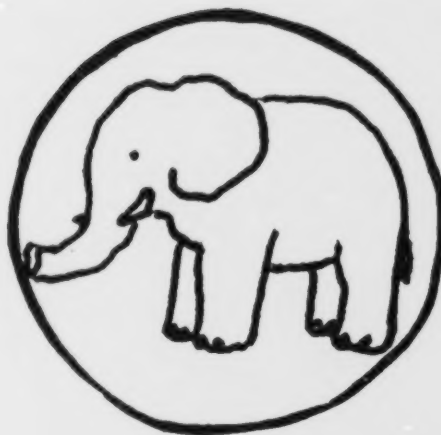
On a worksheet, the student:

- 3 draws picture and lists at least 3 characteristics of mammals, birds or fish
- 2 draws picture and lists at least 2 characteristics of mammals, birds, or fish
- 1 does not draw or list correct characteristics of mammals, birds, or fish

Student Data Sheet Masters

Animals, Animals
Student Data Sheet Master 1.1

Color The Mammals



Animals, Animals
Student Data Sheet Master 1.2

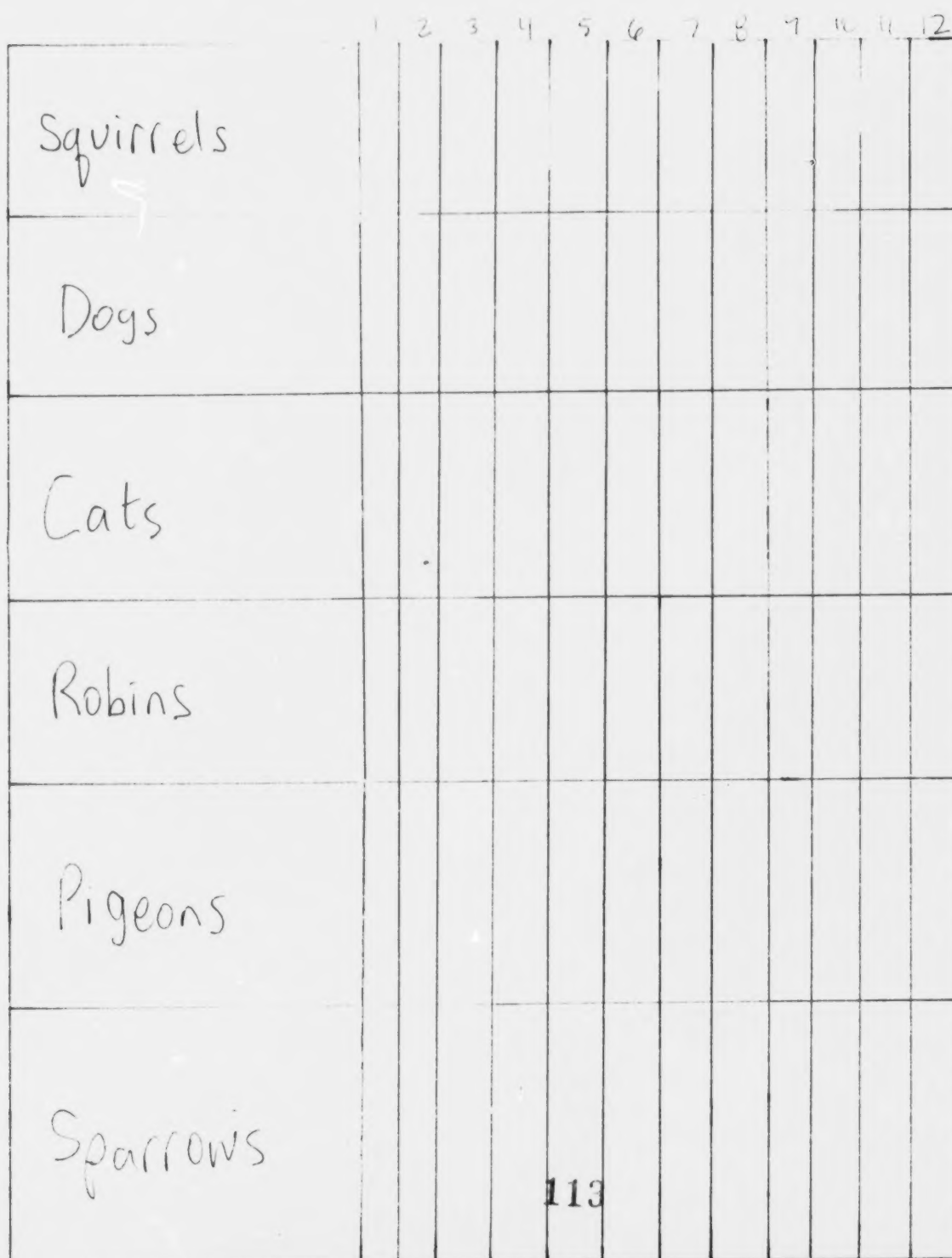
Neighborhood Animals

Count the Mammals and the Birds	
SQUIRRELS	ROBINS
DOGS	PIGEONS
CATS	SPARROWS
OTHER	OTHER

Draw a mammal you saw today. Color the animal's fur the way it looked.

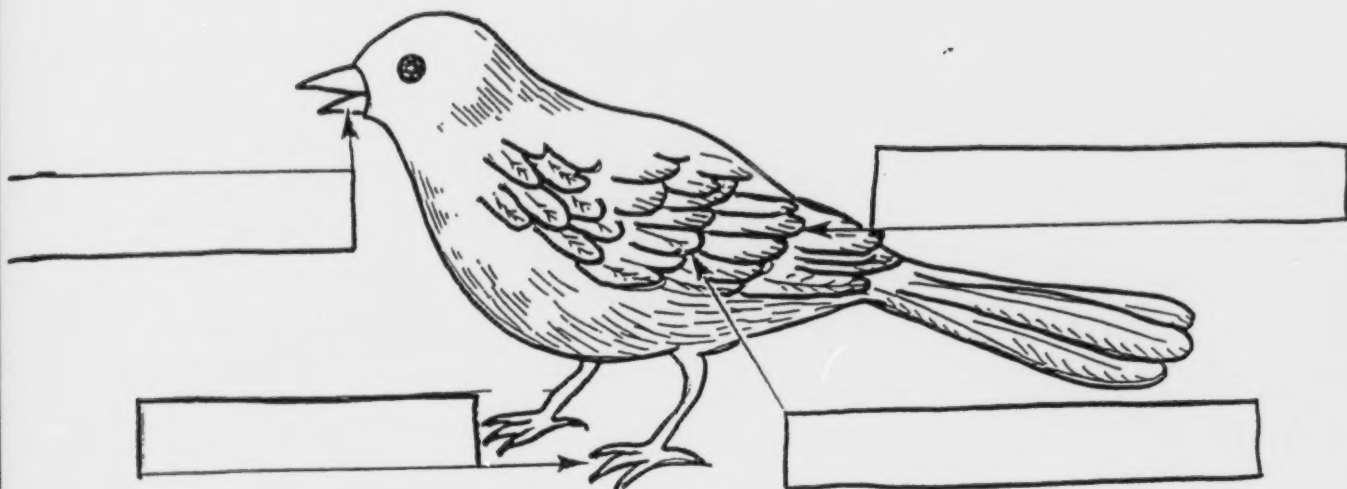
Animals, Animals
Student Data Sheet Master 1.3

Neighborhood Animals Bar Graph



Animals, Animals
Student Data Sheet Master 2.1

Label the Bird



Label the parts of this bird.
Cut, and paste. Color the bird.

Feet
Wings

Beak
Feathers

Animals, Animals
Student Data Sheet Master 2.2

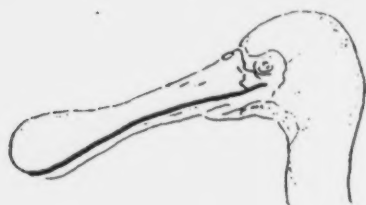
Bird Body Parts



Animals, Animals
Student Data Sheet Master 2.3

Bird Bills

Paste pictures in each box to show what these bills do.



pelican



woodpecker



kingfisher

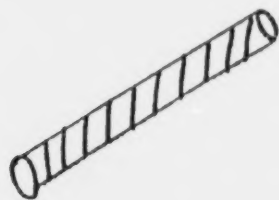
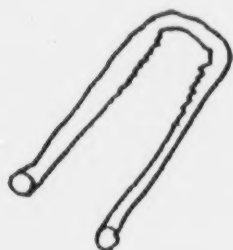


falcon

	11
	1

Animals, Animals
Student Data Sheet Master 2.4

Bird Bills II



Match these
tools with
the beaks
that do the
same jobs.

Animals, Animals
Student Data Sheet Master 3.1

Adopt a Fish

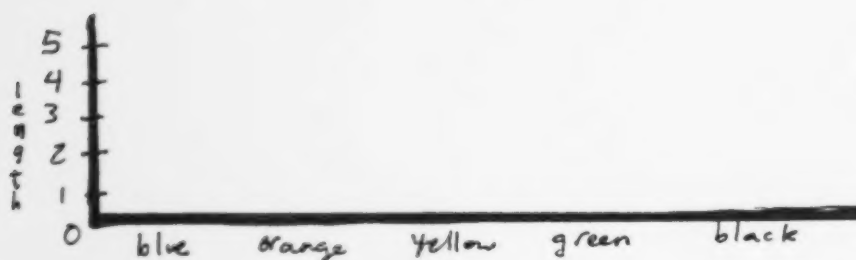
Choose one fish to observe

1. What is your name? Give fish a name.
2. How long have you lived in the water?
3. Why do you live in the water?
4. Can you come out of the water?
5. How do you look? What is your color and shape?
6. Draw your fish.
7. Do you make any sounds?
8. What do you eat?
9. Do you have teeth?
10. What is your swimming pattern?

Animals, Animals
Student Data Sheet Master 3.2

Fish Graph

Type of fish	Length in centimeters
blue	3
orange	2
yellow	1 1/2
green	2
black	3

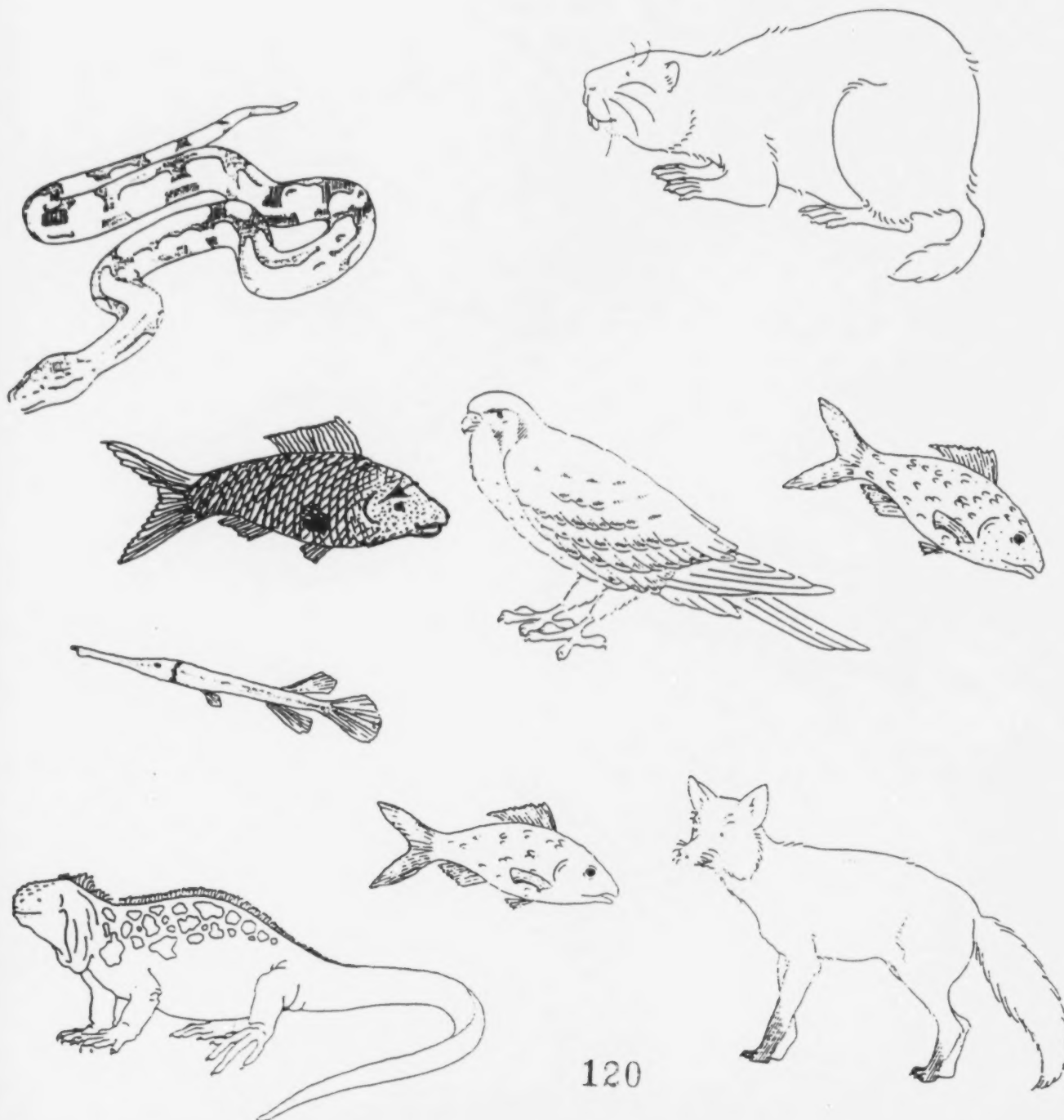


1. Which was the largest fish?
2. Which was the smallest fish?
3. Which fish are about the same size?
4. Do you think the smaller fish are afraid of the bigger fish? Why?

Animals, Animals
Student Data Sheet Master 3.3

Identify the Fish

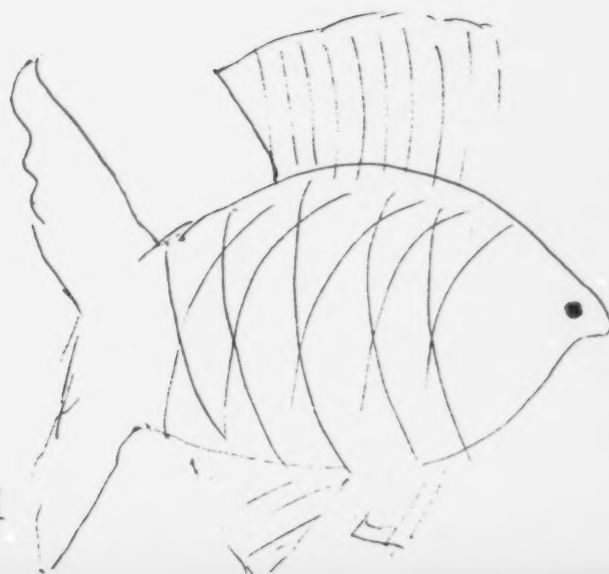
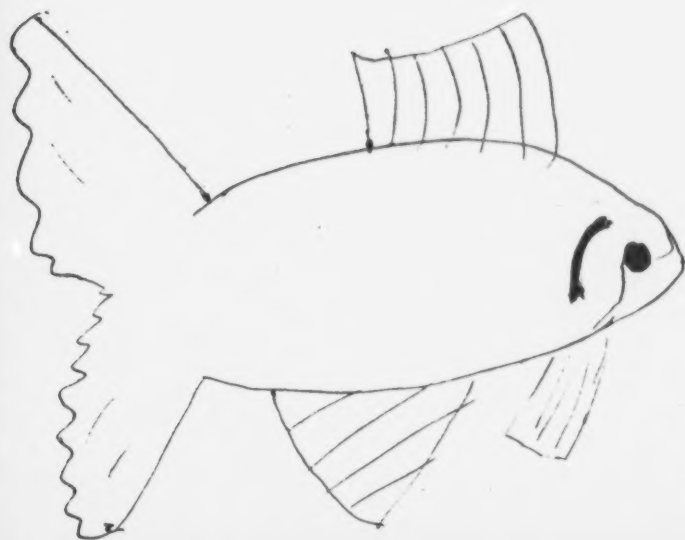
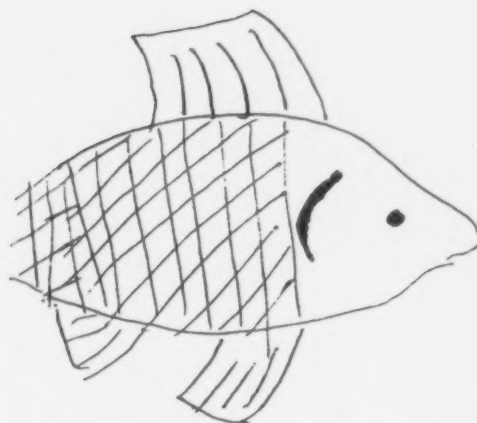
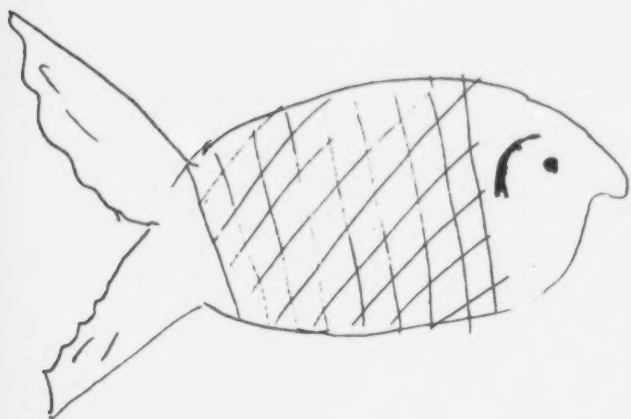
Color the animals. Find and circle the fish.



Animals, Animals
Student Data Sheet Master 4.1

Missing Parts

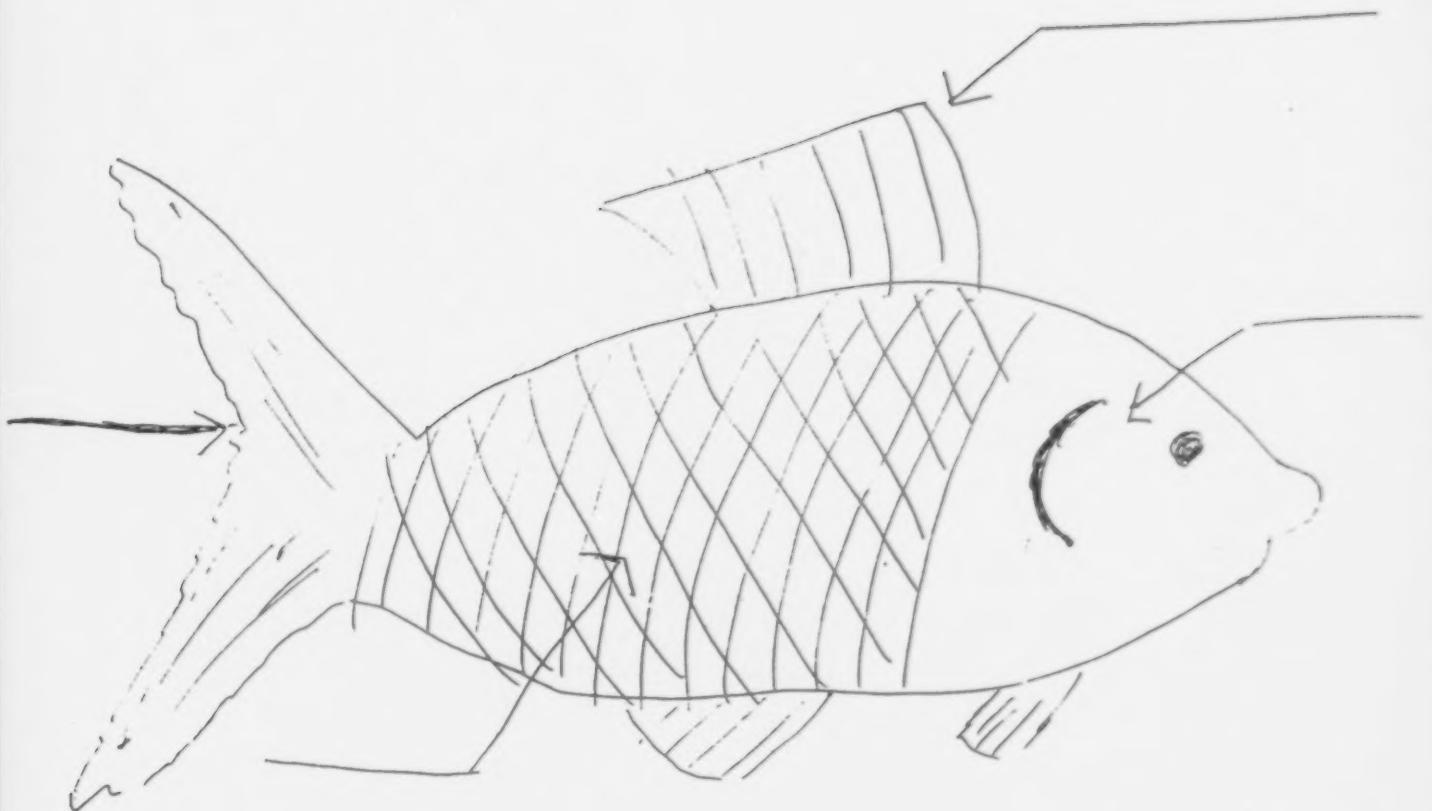
Draw the missing parts on the fish.



Animals, Animals
Student Data Sheet Master 4.2

Label the Parts

Label the _____ parts of the fish.



Our Wonderful Raintree Forests

Community Resource Curriculum Development Project

Developed by: Maureen Conway
Friedricka White

Our Wonderful Raintree Forests

Rationale

This unit is intended to meet the following instructional program of objectives for the Illinois State Goals for learning at the second grade level:

BIOLOGICAL AND PHYSICAL SCIENCES:

Use appropriate scientific vocabulary.

List the characteristics of common living organisms.

Describe the animals and plants found in various regions of the world.

Describe the greenhouse effect and its effects on the environment.

Compare different kinds of body coverings.

SOCIAL SCIENCES:

Identify resources that fulfill our needs and wants.

Recognize the need for conservation of natural resources in our communities.

Identify the ways in which people (and animals) interact with their environment.

MATHEMATICS:

Use mathematics in other curriculum areas.

Content Background

Rainforests are places of dense growing evergreen trees and plants. There is much rainfall, almost everyday (over 100 inches per year). They are sometimes called "jungles" and they are found near the equator. These forests can be found on all the continents except Antarctica and Europe. They are rich in life, not gold or silver. Rainforests are on 6% of the earth's surface and home to more than half of the species of plants and animals of the world. The environment is like walking through a tropical house of a botanical garden. The temperature stays around 86 degrees and there is enough moisture to feel sticky. The weather hardly ever changes and the forests seem to be covered with a thick cloudy mist in some areas. Many bright colored birds and flowers are at home here and the areas are made up with four main levels of tree growth. There are also many types of thick, luxurious broad leafed plant growth.

Interesting questions that may be answered in this unit of study include:

- (1) Where are rainforests found?
- (2) What do they look like?
- (3) What kind of plants and products are grown there?
- (4) What kind of animals live there?
- (5) How do the people live there?
- (6) How are forests being hurt or endangered?
- (7) What can we do to help save our rainforests?

Timeline for Unit

This entire unit consists of six main lessons and creative activities to summarize the study. Three field trips are suggested. The first trip to one of the botanical gardens would familiarize the children with the atmospheric conditions of a rainforest and the lushness and beauty of the plants and flowers. The second trip might focus on the animal and bird life at the "Tropic World" in Brookfield Zoo. The final trip would examine the tropical forest sections at the Field Museum or the Chicago Academy of Sciences.

This unit will last approximately six weeks and cover the four main topics of Environment, Life, Products, and Saving the Rainforests. The field trips suggested will be very helpful for understanding each lesson topic.

Evaluation/Assessment

Students will have regular assessments at the end of each main topic of study. These will consist of questions, hands-on activities, and games. In addition, children can demonstrate that they have an understanding of all or most of the questions asked in the Introduction of this unit. Each class member will be able to relay correct answers to the teacher.

At the end of this unit, guests can be invited into the classroom to see the students' work and ask students about the rainforests. A play can be presented for parents and/or other classes. "Holiday in the Rainforest," an original play by Douglas Love, is a nice little play about saving the Rainforests. It is suitable for a cast of at least 16 children. (Inquiries should be addressed to: HarperCollins Children's Books, 10 East 53rd Street, New York, NY)

Teacher Resources

Earth's Vanishing Forests, by Roy Gallant, Macmillan, 1991.

In the Rainforest, by Debby De Pauw, Evan Moor, 1993.

An excellent resource book for additional activities and large chart.

Rain Forest Amerindians, by Anna Lewington, Raintree Steck-Vaughn, 1993.

Rainforest Nature Search, A Joshua Morris Book, Readers Digest Association, Victoria House Pub. Ltd., 1992. A hands-on guide for nature sleuths, with a real magnifying glass included.

The Animal Atlas (A Pictorial Atlas of World Wildlife), A Doring Kindersley Book, Alfred Knopf Inc., 1992.

The Great Animal Atlas, by Gillian Standring, Studio Editions, Ltd., Dorsett Press, 1992. An oversized, colorful atlas showing pictures of each continent and the locations of all the animals of the world.

Tropical Rain Forests Around the World, by Elaine Landau, Watts, 1990.

Tropical Rain Forest Animals and their Environment, by Wendy Weir, Carson Dellosa, Pub. co. Greensboro, NC, 1993. A great workbook with wonderful instructions for making a mural for the blackboard.

NATURE CONNECTIONS is the Chicago Public Library's new collection of natural history with materials for children, books, magazines, pamphlet, and discovery objects for touching.

Friends of the Forest National Park System of Costa Rica has a special kit. The kit will contain a poster, map and certificate showing location of purchase of land saving 100 square feet of endangered rainforests near Buenos Aires in South America.

"Jungle" Nature Recordings, 1987 (\$11.95).

"Voices of the Earth" 1990.

These 2 cassettes can be purchased by ordering from Earthly Designs (A nature store and gift shop) 8701 Keystone at the Crossing, Indianapolis, IN 46240

A Rainforest place mat also can be ordered from the above store for \$4.50. It shows pictures of animals and their locations on the various levels of the forest.

Lincoln Park Zoo's *20th Century Medicine Man* Science Explorer class is highly recommended to get a good background on rainforests.

Ranger Rick's Nature Scope magazine, vol. 4 #4, 1987 has wonderful rainforest ideas. It focuses on characteristics of rainforests, where they grow and misconceptions people have about these special habitats. From the National Wildlife Federation, Washington, DC.

World Resources Institute
1735 NY. Ave. NW
Washington, DC 20006

This organization has "Keep Tropical Forests Alive", information on how to help save the rainforests

Save the Rainforest, Inc.
Dodgeville High School
912 W. Chapel

Dodgeville, WI 53533

Rainforest Action Network
466 Green St. Suite 300
San Francisco, CA 94133

Tropical Ecosystem Research and Rescue
P.O. Box 18391
Washington, DC 20036

Community Resources

Lincoln Park Conservatory
Fullerton Avenue and Stockton Drive
Chicago, IL
312/294-4770

Garfield Park Conservatory
300 N. Central Park Boulevard
Chicago, IL
312/533-1281

Brookfield Zoo
3300 South Golf Road
Brookfield, IL 60513
708/485-0263, ext. 360
(*make a specific arrangement for the Tropic World Exhibit).

Lincoln Park Zoo
2200 North Cannon Drive
Chicago, IL 60614
312/294-4649

The Chicago Academy of Sciences
2001 North Clark Street
Chicago, IL 60614
312/549-0606

Field Museum of Natural History
Roosevelt Road at Lake Shore Drive
Chicago, IL 60605
312/922-9410

(*Be sure to investigate the Harris Loan section to borrow display materials).

WHERE TO SEE TROPICAL RAINFORESTS IN OR NEAR CHICAGO

(Call or write to prepare for visits. Good for teacher resource and information.)

Chicago Zoological Park (Brookfield Zoo)
2300 Golf Road
Brookfield, IL 60513

Indianapolis Zoo
1200 W. Washington Street
Indianapolis, IN 46222-4552

John G. Shedd Aquarium
1200 S. Lakeshore Drive
Chicago, IL 60605

Miller Park Zoo
Box 3157
Bloomington, IL 61702

Milwaukee Public Museum
800 W. Wells Street
Milwaukee, WI 53233

Career Connections

Careers that might be good for those interested in the study of rainforests might be: Environmental Engineer, Anthropologist, Biologist, Geologist, Medical Scientist, Doctor, Chemist and Pharmacist.

Glossary

ACID SOIL: soil that has few nutrients and is too poor for soil organisms to thrive (plants)

BROMELIADS: tropical plants in the pineapple family that often grow on trunks and branches of trees

BUTTRESS: woody flanges that radiate from the bases of tall forest trees. These buttresses help support shallow rooted trees which might otherwise blow down easily.

CAMOUFLAGE: the use of color and shape in order to merge into the background to avoid detection

DECOMPOSITION: the rotting of dead matter

DEPENDENCE: the way a particular plant or animal relies on other plants or animals for its survival

DORMANT: plant or seed that appears not to be growing but is simply resting waiting for conditions to become right to grow

ECOLOGY: the way living things relate to each other and their surroundings

ECOSYSTEM: a balanced arrangement of plants, animals, soil and climate; the decay of dead organisms provide food for those that are growing; the way all plants and animals in a particular area relate to each other

ENVIRONMENT: all things found in an area: air, land, water, weather, plants, animals and people; how they act together and affect each other

EPIPHYTE: a plant that grows on other plants: the roots can absorb moisture directly from the air

FUNGI: plants that have no roots, stems, leaves, seeds, or flowers. They live in the dark and get nourishment from living things or organic matter.

HABITAT: a combination of environmental conditions that make suitable living (an animal might live in trees — people in houses)

HUMUS: soil formed from decayed debris of vegetation and animal matter: plants need humus for growth

LIANA: a woody vine that is rooted in soil and grows up tree trunks and open areas: they have thick stems and roots that hang from trees

NOCTURNAL: sleeping all day — active at night. Some animals are nocturnal in order to avoid predators.

NUTRIENTS: an essential component of soil or food required by a plant or animal to grow; a substance which provides nourishment and promotes growth

OXYGEN: a gas in the air released by green plants and breathed in by animals and people

PREDATOR: an animal that kills other animals for food

PREY: an animal that is killed for food

QUARTZITE: a rock made from quartz; can be one of the rocks that cannot be broken down into soil and they help make the beautiful waterfalls seen in the Rainforests

RECYCLE: the process of breaking materials down so they can be used again

SCAVENGER: an animal that feeds on dead and decaying matter rather than eating live plants or killing animals

TEMPERATE: mild climate including four yearly seasons of different temperatures

TROPICAL: warm climate including two yearly seasons marked by different amounts of rainfall

LESSON 1: The Tree Layers of the Rainforest

Lesson Introduction/Background Information

In this lesson, the students will learn that the tropical rainforests have four different layers. They will find out that each layer has its own special and unique characteristics. They will discover that each layer is home to thousands of different animals. The layers are called the Emergent, Canopy, Understory and Forest Floor.

EMERGENT:

Here the tallest tree rises above most of the greenery below. Eagles and other birds of prey watch out for animals. These tops gain the most sunlight and can be as tall as a ten story building. Butterflies of many colors, especially the beautiful blue butterfly named the Morpho, likes to fly in this level.

CANOPY:

Trees in the canopy layer are 75-150 feet above the ground. The green tree tops form a cover or a canopy over the forest. These trees also receive more sunlight and rain than is filtered through to the understory layer and the forest floor. The sunlight and rain that does get through is diffused by a giant web of trees and vines. The tree trunks are tall and slender. The canopy trees have shallow surface roots. These special roots are called buttress roots and grow above the ground. They surround the trees and give them extra needed support. The roots can grow as high as 30 feet and they also spread even longer on the ground.

UNDERSTORY:

The understory trees only grow to about 15 feet high. Shrubs, miniature trees, dwarf palms and herbs are found in the understory. The humidity is high and temperatures remain constant. The plants have adapted in order to survive. The leaves are broad and thin allowing them to collect as much sunlight as possible. The leaves are shaped oblong with a pointed "drip-tip" that lets rain drain off quickly. This is important because dry leaves are safer from attack by fungi than wet leaves.

FOREST FLOOR:

The forest floor receives very little sunlight. Vegetation is sparse. It is very dim and still here. The topsoil is very thin. The roots grow near the top of the soil is very thin. The roots grow near the top of the soil where most of the nutrients found. The dead plants and animals that fall to the forest floor decompose quickly.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. describe the characteristics and the differences of the various layers of the rainforests.

Time Allotment

The study of the layers will probably last at least one week with sessions of 40-minutes each day for three days, an art activity one day and the first field trip to a botanical garden at the end of the week. This will give the children an opportunity to become totally familiar with the feel of the tropical rainforest environment.

Materials

posters of rainforest
overhead projector for showing illustrations from books
two-liter plastic bottles (enough for each student)
marking pens
tape
scissors
bird gravel
potting soil
two kinds of very small rain forest plants that would be available from a local florist or nursery (examples: Prayer plant, Heart Leaf Philodendron, Aluminum plant, Baby Tears, Strawberry Begonia or Artillery plant)
pebbles that have been boiled for 5 minutes — optional

Advanced Preparation

Read books about the rain forest (see resource list). There are two excellent books to use for this beginning lesson. They are: *Tropical Rain Forest*, by Jean Hamilton and *Discover Rain Forests*, by Hardie Baptista.

Procedure

Tap Prior Knowledge

1. Ask Students "What do plants need to live? What does the word "tropical" mean? What is a forest? Why do you think some are called rainforests?"

Share With Neighbor

2. Let the class examine the room posters and other pictures that are available which show the layers, and encourage responses. Inform them that they will find out about the animal life in each layer during the following week. Allow some reading time at the library table for small group reading and discussion.

Hands-on Activity

3. Make a Rainforest Terrarium. Remove label and black plastic bottom of the bottle by rinsing bottle with warm water.
4. Cut the bottle at the top where it begins to curve (an adult should do this). Bottom of bottle will slide off.
5. Line inside of the bottom with a piece of plastic wrap that has been folded over several times.
6. Spread 1 inch of bird gravel on the bottom of the bottle over the plastic wrap and spread a layer of charcoal over the potting soil.
7. Fill the container with potting soil.
8. Dig a little hole for each plant and put in two rainforest plants. Add stones or pebbles.
9. Water plants with one quarter cup of water.
10. Place a clear plastic bottle over the bottom. Set on a window sill, but make sure it is not in direct sunlight. Droplets of water should form on the inside of the terrarium and will rain down on the plants. If it is too dry, open up the cover and add a little more water. If it is too wet and becomes foggy, take the cover off and leave it open overnight.
11. Have class try to make their own drawings of the rain forest tree layers after having read and looked at pictures. Later these pictures can be blown up by using an opaque projector and they can be cut out to use for Rainforest room decorations.

Introduce Principle/Concept

12. Explain to the students that the rainforests have different layers and that each layer plays an important role not only for the plant growth, but the animals and people who live there as well. Each layer can be defined by its height and the animals living there. The temperature and atmosphere of each layer is different.

Relate Activity and Concept

13. Students will draw pictures of own ideas of how a rainforest should look. They can begin making a mural for the bulletin board. The mural can be ongoing.

Safety

Students will be careful with making their terrariums and remind them how adults should do the cutting.

Home Activity/Parent Involvement

Children can compare the height of the rainforest trees to the tall buildings around the school. Ask parents to take children to the downtown area to look at the Sears Tower and imagine if one of the emergent layer trees could get to be as tall. Try to find a 20-story building to make a comparison.

Lesson Assessment

Children will be able to identify, compare the different layers by drawing and labeling the different levels. They will also be able to explain what the different levels are.

Extension Activities**Books to Read**

A Walk in the Rainforest, by Kristen Joy Pratt, Dawn Publications, 1992.

Additional Activities

Compare the layers of the rainforest to the school building's different floors.
Example: The school has 3 different levels.

Additional Community Resource Excursions

Arrange field trip to Garfield Park or Lincoln Park conservatory.

LESSON 2: Animals of the Rainforest

Lesson Introduction/Background Information

Animals of the EMERGENT LAYER:

Only a few animals can stand the heat and strong winds of the emergent layer, including birds, insects and butterflies. Some of the birds there are:

- Harpy Eagle: The most powerful and the largest eagle in the world. It eats monkeys, sloths and opossums.
- Vulture: African and Turkey vultures. They do not kill;; they wait until other animals are dead and are easy to eat.
- Toucan (too-kan): This brightly colored bird spends much of its time living in both the emergent and canopy layers. The toucan's bill is extremely large, but it is light in weight. The bird eats insects, fruits, berries and tiny birds.
- Woodpecker: Lives in all layers of the rainforest. It pecks at tree barks looking for insects to eat.
- African Colobus (KAHL-uh-bas): Visits the emergent layer. It does not fly, but rather glides by means of webbed toes and flaps of skin along its legs, sides and tail. The flaps open like a parachute as the animal soars from tree to tree.

Animals of the CANOPY LAYER:

More animals live in the canopy than the emergent layer. The canopy offers more protection from the intense heat and strong winds and rains.

Some of the many animals that make their home in the canopy are:

- Howler Monkey: The howler monkey lives in South America. It gets its name because of the loud howls it makes in the rainforest. The howler monkey's screams can be heard more than a half-mile away.
- Red Colobus Monkey: The red colobus monkey lives in the Guinea rainforests of Africa. It eats the leaves of the canopy layer.
- Black Colobus Monkey: The black colobus monkey is the cousin of the red colobus monkey. It also lives in the rainforests of Africa.
- Orangutan: Orangutans live in the southeast Asia rain forests. They have reddish fur bodies. They have long muscular arms which reach down to their ankles. They use them to swing hand-over-hand through the trees. They sleep at night in a nest made of sticks.
- Gorilla: Known as "gentle giants." They are vegetarians and feed on leaves, bark and fruits. They live in close knit groups of up to 30 members. They communicate by using a wide range of sounds and gestures. For example, a male threatens his rivals by standing up and beating his chest. Male gorillas over 10 years of age have silvery gray hair on their backs and are call "silverbacks."
- Golden lion Tamarind (TAM-uh-ruhn): The golden lion tamarind lives in the Brazilian rain forests. It has bright orange fur. It eats insects, small lizards and fruits. The tamarinds are being captured for pets. Most of their rainforest homes have been destroyed. The golden lion tamarind is now a endangered species. It has become the symbol for wild life conservation in Brazil.

More birds live in the canopy layer than the emergent layer. There are thousands of species living there:

- Ant Bird: The ant bird lives in Latin America. There over 200 species of ant birds. They eat insects. They got their name because they depend on ants to help them locate food.

Butterflies include

- Budwing: Budwing butterflies have a wing span of eight inches. The budwing butterfly's brightly colored wings are a signal to other animals that they are poisonous. Budwing butterflies can also be found on the forest floor looking for food or water to drink.

- Blue Morpho: The blue morpho butterfly is one of the most desired butterflies in the rainforest because of its iridescence. The butterfly's undersides resemble leaves or tree bark. The butterfly's beauty is breathtaking. It is endangered because so many have been captured by collectors. They are sometimes seen in the emergent layer also.

Snakes include:

- Boa Constrictors: They camouflage themselves among the trees and leaves. Their color and shape blend into the forest understory plants.

Animals of the FOREST FLOOR:

Insects and spiders are found on the forest floor. The insects have more impact on the forest than any of the other animal groups in the forest. Very few of the insects and spiders are dangerous to people. The insects and spiders, however, can cause painful and itchy wounds. Bees, wasps and ants are commonly found. They will not harm people unless they are bothered.

- Spiders: Are often poisonous. They tend to bite prey and not people. The most annoying insect is the botfly. They are bloodsucking flies that lay their eggs on mammals, including people. When their eggs are hatched, the larvae burrow under the skin causing painful itching.

- Cockroaches: Four thousand known species. The blaberus giganteus is the size of your palm. Cockroaches eat bat excrement called guano.

- Termites: More than 2,000 species of termites. They live in large colonies and like honey bees. There is little wood on the forest floor because of the termites.

- Army Ants: Millions of army ants march as a group and according to legend, army ants march in long columns as wide as 40 feet. They will eat anything in their path. They move about 65 feet an hour. They live in 2 phases — the nomadic phase and the stationary phase.

- Leaf Cutter Ants: Cut leaf pieces and bring them back to their nests. They also help keep the floor clean.

Snakes, lizards and alligators live on the floor level. The high humidity generates the many poisonous snakes, however, it is very difficult to locate them. Some of the reptiles include:

- Fer-de-Lance: Lives on the ground among the leaf litter, tree roots and buttresses. It can be as long as seven feet and its bite is very deadly.
- Caiman: Is a type of crocodile. It lurks underwater with just its nose and eyes showing. When a thirsty animal comes for a drink, the caiman snaps it up with its sharp teeth and holds it under water until it drowns.

Animals of the UNDERSTORY:

More insects are found in the understory level. Many of the insects adopt disguises or camouflage to protect themselves from predators.

- Katydid: Have flat bodies and green wings. Their shape and color made them look like another leaf on the understory shrub. The katydid feeds on the plants it resembles.
- Mimicry: Is the larvae of the sphingid butterfly. The green larvae hides among the plants of the Central America Understory rainforest. The larvae swells its thorax and swings its head when threatened by predators. Its appearance resembles a snake, therefore, predators are scared away.

Many different types of bats live in the understory. Not all bats eat the same thing. The diet of some bats consist of the nectar from flowers. They also pollinate the flowers.

- Vampire Bats: Drink the blood of other animals that live in the Latin American rainforests. Less than 1% of the thousand species of bats in the world are vampire bats.

Small cats eat birds, lizards and rodents.

- Jaguar: The jaguar is the largest cat in South America. Unlike the leopard, it has black marks inside each ring of spots. Its coat acts as camouflage in the forest, and it can creep up on the animals without being seen. It likes small deer and tapirs.
- Ocelot: This beautiful cat has become very rare because its forest home is being destroyed and it is hunted for its fur. Each cat has different markings. It likes to climb and swim and comes out at night to hunt for birds, snakes and small animals.
- Okapi: Uses strips on its legs for camouflage. It is related to the giraffe. It has fur covered horns and a tongue so long it can clean its own eyes and eyelids. It uses its tongue to get food.
- Antelope: Is the size of a rabbit and has pencil-thin legs. It can leap 9 feet with one bound. It is shy and timid and hides during the day and comes out at night to feed on leaves.

Dense foliage can help keep birds out of sight as they eat flowers or fruit on trees, or eat insects off the bark and leaves. Many of the birds have been in

North America and European forests during the summer, and fly to the tropical forest when winter makes food and shelter scarce.

- **Tiny Bee Hummingbird:** Lives in Cuba and is the smallest bird in the world. It beats its wings faster than the human eye can see and sips a lot of nectar from flowers with its very long bill. It can hover in one place and fly backwards. It does not need to be camouflaged, as it can fly off at speeds of up to 40 miles an hour.

Boa Constrictors and Anacondas live in Latin America and Pythons live in Africa and Asia. They are the largest snakes in the world. Pythons and Anacondas grow well over 30 feet long and weigh over 200 pounds.

Poisonous frogs, otherwise known as poison dart frogs, are very colorful. Their bright colors are a warning to other animals to stay away. Poison dart frogs are located in Central and South America.

Fungi, lichens, termites, spiders, land crabs, earthworms and beetles also make the forest floor their home. They help decompose material and help keep the forest floor clean by recycling debris into life-giving nutrients.

Giant anteaters have long tongues and snouts to suck out ants and termites from nests. The Malayan tapirs use their broad snouts to root out insects and worms.

The giant armadillo is about the size of a sheep. At night, it uses its huge claws to dig for worms, ants, termites and snakes on the forest floor. The claws on its front feet are the largest of any living animal.

Specific Lesson Objectives

The students will:

1. identify the different animals of each layer.
2. tell what each animal eats.
3. describe the appearance of the animals.
4. define the following words: fern, predator, algae, species, camouflage, protect, nectar, poisonous, endangered, larvae, carnivorous, conservation, swells, wing-span, wild-life, pollinate.
5. locate on a map or globe where the animals live.
6. know the following directions: north, south, east, west, northwest, northeast, southwest, southeast.
7. predict what will happen to the animals if a species becomes extinct or if their homes are destroyed.
8. identify an animal's body coverings.

Time Allotment

The lesson can be divided as desired into as many as five or more 40-minute sessions.

Materials

pictures of rainforest animals.
world map
different types of coverings such as: fur, feathers, etc.

Advanced Preparation

Read the book *The Animal Atlas* by Barbara Taylor, Alfred Knopf, 1992.

Procedure**Tap Prior Knowledge**

1. Have students share information on what they already know about animals that live in the rainforest.
2. Write categories of animals and information on board as children respond (The information can be changed as children begin to study the unit).

Introduce Principle/Concept

3. Although many animals live in the rainforest, scientists continue to discover new species. Review the kinds of animals that live there and how they are well-suited for the environment. It is very important to show pictures of each rainforest animal. With data sheet and clip art pictures, children should color the animals according to the specific color of the animals body coverings. Review new vocabulary words with the students.
4. Help students understand food web principles and that if one animal becomes extinct, it has an effect on many other animals that are still living.
5. They should understand how some rainforest animals live on different continents. Work with a world map and have children explain the names of the continents, their locations and the places where these animals will be found. Children can label these themselves after more study. review the direction north, south, east, west, etc. with them.

Relate Activity and Concept

6. They should understand that animals eat different foods and live in different layers because it is the best place for them to survive. Ask students: "What would happen if someone took their home and food? Would they not have to find a new place to live and find somewhere to get new food to eat in order to continue everyday life?" (A thought-provoking question to get students thinking about the animals).

Home Activity/Parent Involvement

Everyday, children get to take home a book about the rainforest. The parents will receive a letter explaining what the children are learning in this unit (see attached example). Parents can help children read the books. Students can

bring in a written description of what they liked or disliked about the book and why.

Lesson Assessment

Students should be able to name and describe at least two different animals of the rainforest and on which layer they can be found.

Extension Activities

Additional Activities

Have children draw an imaginary rainforest animal. They can name it, explain what it eats and what continent and what layer it lives on. Ask them to name a predator of their imaginary animal.

Make a collage of different rainforest animals.

Additional Community Resource Excursions

Arrange a trip to Brookfield Zoo. Plan on visiting "The Tropic World."

Parent Involvement Notes And Sample Letter

A Letter can be sent home to parents explaining how they will be called on to:

1. Accompany children on the field trips planned.
2. Help with gathering pictures for scrapbooks.
3. Participate in reading from suggested rainforest book lists.

Dear Parent/Guardian,

Your child is about to begin a very special and exciting study of some parts of our world called rainforests.

The children are going to read about, explore, take field trips and become totally involved in the experience of being in a rainforest. We ask you to help them gather pictures for their scrapbooks, donate plants (if possible), participate in the reading of some of the many books we will have on our library table and help with artwork and costume making ideas. We also need you for the trips we plan to take.

Notes will be sent home periodically to keep you informed and we hope you will be just as enthusiastic and excited about this study as your child.

LESSON 3: Foods of the Rainforest

Lesson Introduction/Background Information

In this lesson, the students will learn that the rainforests grow many of the foods that we eat every day, in addition to possessing foods for the animals and people of the rainforest. Without the rainforests, we would not have the variety of food that we have today.

Many of our food sources have originated from the tropical rainforest. Foods that we associate with other countries have really come from the rainforest. The Swiss would not have chocolates, the French would not have vanilla, and the Italians would not have tomato sauce without the rainforest. All these plants — cocoa for chocolate, vanilla, and tomatoes originated in the tropical rainforest of Latin America.

A few common rainforest foods are:

FRUIT

bananas
coconuts
oranges
lemons
grapefruit
avocado
pineapples
papaya

SPICES

black pepper
cinnamon
ginger
vanilla
all spice
chocolate
coffee
tea
tapioca
peppers

OTHER

Brazil nuts
cashews

wild-
relatives-
of:
rice,
wheat,
corn

Specific Lesson Objectives

The students will:

1. identify the foods that grow in the tropical rainforest.
2. classify the foods into major food groups.
3. locate Latin and Central America on the world map.

Time Allotment

The lesson can be divided, as desired, into 40-minute sessions over a two- or three-day period.

Materials

world map
spices and foods
milk cartons
tomato seeds
soil

Advanced Preparation

Have some of the spices and products named already on a display table. You can start off by giving a bunch of bananas cut up in cereal (have plastic bowls, spoons, cereal and bananas). Children can bring milk cartons up from lunch.

Procedure**Tap Prior Knowledge**

1. Ask the students "What foods do you think grow in the rainforest? Who eats the foods that grow in the rainforest? What would happen to the people, animals and foods that grow there if the rainforests were destroyed?"

Hands-on Activity

2. Have students plant tomato seeds. Make a list of some of the foods that have tomatoes in them. For example: Spaghetti sauce, pizza, soup...etc.

Introduce Principle/Concept

3. Initiate a discussion with the class about the fact that some of the foods that we eat every day and take for granted come from the rainforests.

Relate Activities To Concept

4. Have students taste different foods that originate from the rainforest. classify them into groups. With a map, show where they come from.

Home Activity/Parent Involvement

Parents can help children find various spices around the house that they might share with the class. Try to find some that are not used everyday. These could be set out on the display table on a temporary basis.

Lesson Assessment

Children will be able to name some foods that we obtain from the rainforest areas as well as the continent area these might originate from.

LESSON 4: Plants Of The Rainforest

Lesson Introduction/Background Information

Lianas are vines that grow out of the rainforest floor. They can grow as long as 300 feet. Lianas climb up towards the canopy layer. They don't have a woody trunk to support themselves, so they have different ways to climb upwards. One way they climb up is to wrap themselves around young trees. Then, as the young trees grow, they pull the liana up with them. Another way is to wind itself around tree trunks. It is very dangerous to the trees when lianas become entangled in the tree branches. The lianas can pull the trees down causing other trees to topple over. Other plants, such as, vines and figs have roots that fall all the way to the forest floor to pick up nutrients.

Epiphytes are plants that grow on the canopy layer. They get their nourishment from the air and water. Some plants hold pools of rainwater in their leaves. The plants eat the insects that fall into the rainwater. The orchid and the bromeliad are epiphytes. Each plant flower has a specific color, shape and scent that attracts different animals.

Many animals make their home in epiphytes. Tree frogs grow up in the air plant rainwater pools. Insects like the praying mantis hide from its predators among the air plants. Lizards drink from the epiphytes' rainwater pools.

Medicines come from the rainforest plants. Some diseases have been cured with rainforest plants. A cure for a type of cancer was discovered in the rainforest periwinkle plant. Scientists say there are many other plants that have yet to be discovered.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. define what a epiphyte plant is.
3. tell where an epiphyte grows in the rainforest.
4. tell how plants help heal us.
5. tell what animals live in epiphyte plants.
6. tell how the plants protect the animals in the rainforest.
7. explain how the lianas and epiphytes get their nourishment.

Time Allotment

The lesson can be divided, as desired, into 40-minute sessions.

Materials

plants from a florist
books on rainforest plants
pictures of rainforest plants
pictures of animals that live in the plants

Advanced Preparation

Set up a discovery table with rainforest plants, pictures of rainforest plants, pictures of rainforest animals and books about the rainforest.

Procedure

Tap Prior Knowledge

1. Invite the students to share information about the importance of the rainforest plants. Ask "Who uses the rainforest plants?" "Why?"

Hands-on Activity

2. Show pictures of the different rainforest plants to the students. Have the students draw pictures of the rainforest plants. The students should glue the rainforest plant pictures to the room rainforest mural. Enlarge pictures of rainforest plants using an overhead. Xerox the enlarged picture of the plant and have students color the picture in appropriately.

Introduce Principle/Concept

3. Discuss the idea that tropical plants are the homes of animals. Tropical rain forest plants (epiphytes) grow in the air and use a host plant. The plants help camouflage the animals from their predators. Plants help cure many diseases. Scientists believe that there are many plants not yet discovered.

Relate Activity To Concept

4. Read books about the rainforest plants.

Connect To Other Everyday Examples

5. Discuss with the students how rainforest plants have cured many diseases. Talk about the diseases that do not yet have a cure. Ask the children to think about how many more diseases could be cured because of new plant discoveries.

Home Activity/Parent Involvement

Have the students research a rainforest plant. The students should make a poster of a rainforest plant and its characteristics and the names of the animals who need the plant to survive.

The students should take home books about the rainforest plants and read them to their parents.

Lesson Assessment

The students' oral participation should be noted. Their posters will also be part of the assessment. The students should be able to define an epiphyte plant and how it grows. They should also be able to name the animals who depend on the rainforest plants.

LESSON 5: Products of the Rainforest

Lesson Introduction/Background Information

The tropical rainforests are a source of many raw and natural resources. Tropical wood is one raw product that comes from the rainforest. Mahogany from the Central American rainforests is the finest wood known for making furniture and office paneling. Teak wood from southeast Asia is used for ship-building. Balsa wood from the tropical rainforest is used to make model airplanes.

Some of the rainforests' natural products are: fibers, waxes, acids, alcohols, flavorings, sweeteners and dyes. The fibers of the kapok trees are used to make life-jackets. The kapok trees grow in African, Southeast Asian and Latin American rainforests.

The white latex of the chicle tree is used to make chewing gum. The gummy sap is collected from the chicle tree. Chicle trees are cut into to allow the gummy sap to drain out into small collection cups. Most of the gum we chew today is based on synthetic resins. Real chicle for chewing gum is sold from Central America.

Fuel is another product offered by the tropical rainforests. Scientists found several rainforest trees that produce hydrocarbons mixed with water. When the water is removed from the hydrocarbons, the hydrocarbons burn like petroleum.

The Brazilian copaiba tree produces almost pure diesel fuel like that burned by large trucks. Indians use the oil as a skin softener.

Insecticides are made from tropical rainforest plants. Many rainforest plants have evolved chemicals that repel insect pests. Scientists are looking for these natural insecticides that are less harmful to humans than the synthetic chemicals farmers use today. The derris liana's roots contain a natural insecticide called rotenoids. These rotenoids are used by rainforest tribes as fish poisons for the tips of arrows.

Specific Lesson Objectives

The students will:

1. identify the raw products of the tropical rainforest.
2. identify the natural products of the tropical rainforest.
3. recognize the importance of tropical rainforest products.
4. use appropriate scientific vocabulary.

Time Allotment

This lesson can be divided, as desired, into 40-minute sessions.

Materials

gum
wood
map or globe

Advanced Preparation:

Set up a discovery table with several types of rainforest woods (mahogany, balsa, teak), books about the rainforest, and pictures from the tropical rainforest.

Procedure**Tap Prior Knowledge**

1. Ask the students "What is a product? What products come from the tropical rainforests? What things are made from these products?"

Hands-on Activity

2. Bring in Chocolates gum. Let the students look at the white latex inside the gum. Discuss the name of the tree where the white latex is found. Let the children chew the gum. Ask the children to describe the texture of the gum. Ask the students if the gum falls apart or sticks together. Let the children examine the different types of wood, too.

Introduce Principle/Concept

3. Be sure the students understand the definition of the word "product." Explain that the products from the tropical rainforest play an important role in our lives. The furniture we sit on and eat off of come from the rainforests. The diesel fuel found in the Brazilian capaiba tree will help fuel large trucks. The natural insecticides used by farmers are healthier for us.

4. Use a map or globe to point out the countries or continents where the rainforest products are found.

5. Be sure the students understand that the sales of these products are very important to the people of the tropical rainforest.

Relate Activity and Concept

6. Ask the students to think about how different our lives would be if we did not have the products of the tropical rainforests. Ask them what things in our life would be different. Ask them how the discovery of fuel like diesel fuel found in the capaiba tree is going to make a difference in the environment.

Lesson Assessment

Students will identify the natural products of the rainforest and the raw products of the rainforest. The students will also research a paper and make a poster on the products of the tropical rainforest.

Safety

Students should be reminded that insecticides are poisonous. Remind them that they should not drink or inhale insecticides.

Home Activity/Parent Involvement

Students should make a poster of the products of the rainforest. Children should research a product of the rainforest, and write a paper about the product.

LESSON 6: People of the Rainforest

Lesson Introduction/Background Information

In this lesson, the students will concentrate on two special groups of people. Those who hunt are called Pygmies (They like to be called Forest People). They are very short — only four to four-and-a-half feet tall, and they still get their food by hunting with bow arrows, blow guns or spears. They live in groups and they like to catch antelopes and other small animals. They eat fruit, roots, seeds, berries and insects also. They especially like to gather honey. Men, women and children participate in gathering food and live on what they find in the forest floor each day. These people are Mbuti in Iture Rainforests. They live near Zaire in West Africa. They are the smallest people in the world.

People from the Amazon region (southern Mexico and Central America earn their living by tapping rubber, collecting palm hearts (oil), bananas and brazil nuts, as well as other products. Some of these regions have been saved because people learned to farm by using "slash and burn" methods. They cut down trees, let the vegetation dry and then burned them. The ash left by the fire makes a rich nutrient bed for crops. Fertility is lost after a few years, so the farmers move on to let that area grow into tropical lush growth again.

The forests can be kept if allowed to grow back, but new settlers moving into rainforests do not allow growth enough time which usually takes about 20 years.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. compare two distinct groups of people who inhabit the rainforest regions and their methods of surviving.
3. identify ways these people can show us how to help save the rainforests.
4. identify certain areas on a world map of where these people can be found.
5. identify the meaning of the "greenhouse effect."

Time Allotment

this lesson can be completed with one 40-minute session showing a Rainforest video tape and two 40-minute sessions discussing and describing where these people live, how they dress and where they are found

Materials

The display table should have a collection of household items and foods previously described. Books, magazines, charts and pictures will be available for individual and group study. Musical instruments such as Rain Stick and drum should be on display. Have a bow and arrow and a hollow tube (paper

towel) to represent a blow gun. Children should each have a journal or use blank pages to make up their own scrapbook of information and impressions.

Procedure

Tap Prior Knowledge

1. Ask the students, based on what they have already learned "What do you think people of the rainforest look like? How do you think they would dress? Do you think they would be in constant danger?"

Share With Neighbor

2. Allow children to read books and magazines in small groups at a table or individually at their desks. Ask parent volunteers to help with reading books and working bulletin boards.

Hands-On Activity

3. Have students draw pictures of Forest People (data sheet 6.1) and arrange them in journals. They will use pictures of products they have found in magazines and place them on pages to associate these with the people. At the display table, children will observe, compare and categorize the various items that are brought in.
4. Children can manipulate objects from the display table such as the drum, rainforest stick or blow gun (decorated paper-towel holder), to play act and use imagination. Children can work in groups of three or four to create their own stories while using the objects.
5. Small groups will come up to an enlarged world map and point out regions where the various groups of rainforest people and animals live.

Introduce Principle/Concept

6. Our study of the rainforest people will concentrate on two special groups, mainly the hunters and the farmers. Also, how the activities and the environment of these people relate to our own everyday way of living through the use of the resources and products made available to us by them.
7. People who live in the rainforest gather edible fruit, eat wild animals for protein, grow fiber for clothing, use trees for rubber, beautiful woods such as mahogany and teak, incense for religious ceremonies, natural insecticides, and find medicinal plants to cure tooth-aches and snakebites.
8. The rainforest people have access to a combination supermarket, pharmacy, hardware store and sporting-goods shop. They have plants that can cure head-aches, kidney problems, kill parasitic worms, and ants that can heal cuts quickly. Cortisone found from some of the vines can treat arthritis, rheumatic fever and inflammation of skin and eyes.

Relate Activities and Concept

9. Ways of the Hunters: The slash and burn method of the farmers has already been described. Fast crops using this method are: bananas and sweet potatoes. An important feature that these farmers use is "knowing when to plant." When flowers of the mahogany tree fall — it is time to plant corn. When corkwood tree flowers fall — it is time to plant watermelons. They also time their planting to the conditions of the rainforest. Children can have a brunch of bananas cut up in cereal, taste kiwi fruit or figs or drink papaya juice and chew a stick of chicle gum to further emphasize the kinds of foods the people of these regions grow.

Safety

Children should be reminded that even though many of the products help us when we are sick, they can be very poisonous if not used correctly. Never take medications without supervision or taste something just because it looks good and looks like a fruit.

Home Activity/Parent Involvement

Encourage parents to help children find appropriate pictures of plants, people or products to help make their scrapbooks. They will be asked to help with art projects and decorating the room as a "jungle."

Student Data Sheet Masters

Forest People

Lesson Assessment

The activities of this lesson will be assessed on an on-going basis as children participate in the discussion and dramatic activities. Journals will be collected for display as one of the culminating activities, and quiz sheets and games will be on-going for checking understanding of the lesson.

Extension Activities

Books to Read

What Do We Know About the Rainforest? by Brian Knapp, Simon and Shuster, 1991. (This book will be helpful background information. It has beautiful pictures explaining the meaning rainforests, the environment, use trees, inhabitants —both people and animals— and the future of the rainforests.)

Rainforest Homes, by Althea, Cambridge University Press, 1985.

The Rainforest Children, by Margaret Pittaway, Oxford, 1980.

Jungles, by Mark J. Rauzan, Doubleday, 1992.

A Walk in the Rainforest, by Kristin Joy Pratt, Dawn Publications, 1992.

"Rainforest Rap." Available from World Wildlife Fund

1250 24th St. NW

Washington, DC 20037

Our Wonderful Raintree Forests

Final Assessment

At the end of this unit of study, children will be expected to:

1. Point out tropical rainforest areas on a world map and name some of the animals that live in these regions.
2. Show understanding of the ways these areas are being endangered and explain how each of us can help save our rainforests.
3. Dramatize-- by poetry, play or song-- some knowledge of the rainforest environment.
4. Work as a group or individually in making a rainforest scrapbook showing pictures of animals, plants or products found in the rainforests.
5. Conduct a tour of the classroom of the classroom or school area that has been decorated with related class art-work.
6. Name some of the products or medicines derived from the rainforests.

Additional Questions

Why does it rain so much in the rainforest?

The sun rises quickly and heats the ground. The warm air rises drawing moisture from the ground carrying it high into the sky. The air cools and forms water droplets that make clouds. By noon the sky is pouring torrential rains every day.

Why is the soil so thick?

The soil is thicker than in any other place on earth. Rocks are under constant decaying conditions forming more soil.

Where do the waterfalls come from?

Quartzite rocks do not weather like the other rocks that make soil. Beautiful waterfalls are produced by rivers falling over these rocks.

Is the beautiful toucan bird's bill very heavy?

The bill which is nearly as big as its body is made of the same material as your fingernails and is very light. The bird can perch on a strong branch and reach fruits and berries with its long light bill easily.

What is a beautiful flower that is used to treat children's leukemia called?

The rainforest plant called "rosy periwinkle."

Student Data Sheet Masters

Our Wonderful Raintree Forests
Student Data Sheet Master 6.1

Forest People

Draw some of the people who live and work in the rainforest.

Our Wonderful Raintree Forests

True or False Quiz (Might use after Environment or Animal lessons.)

1. Canopy trees are the tallest layer in the rainforest.
T F
2. Soil is very thick on the forest floor.
T F
3. A elephant can be found in the rainforest.
T F
4. It gets very cold at night in the rainforest.
T F
5. The forest is easy to walk through.
T F
6. People who live in the rainforest wear a lot of clothes.
T F
7. There are bears in the rainforest.
T F
8. Many colorful flowers, birds and animals live in the rainforest.
T F
9. The forest floor is the safest place to be.
T F
10. Match the following animals for the correct answer:

Which are the fastest, slowest, smallest and largest animals that can be found in the rainforest?

Hummingbird

largest

Sloth

fastest

Jaguar

slowest

Eagle

smallest

The Necessity of Saving the Rainforests.

If we do not treasure our rainforests, land for the most beautiful and exotic wild animals will disappear. We will lose many plants that can help cure diseases. There are many plants that we have not even discovered yet that may help cure certain cancers or AIDS. Destroying the rainforests could:

1. Drastically change our weather patterns. The forests help replenish the oxygen in our atmosphere. Burning releases carbon dioxide into the atmosphere. It creates a greenhouse effect when the temperature of the earth's atmosphere warms up causing environmental problems including flood and drought. There would be no evaporation from leaves if forest leaves are burned and therefore much less rain would fall.
2. Cause serious local problems, including increased soil erosion and water pollution.
3. Cause cultural traditions of the many native peoples to disappear. Each time a "medicine man" dies, it is as if a library has burned down.
4. Many people outside the rainforest who depend on the products and foods we take for granted, would become scarce or more expensive.

Here Are Some Ways We Can All Help Protect Rainforests:

1. Avoid wood products made from mahogany, rosewood, teak or ebony (These woods come from the trees of the jungles).
2. Don't buy exotic pets such as parrots and tropical fish (only if they are bred in the USA.). Also, don't buy fur coats, and items such as alligator shoes or snakeskin shoes, belts or bags.
3. Recycle aluminum cans.
4. Support conservation organizations like Brookfield Zoo, World Wildlife Fund, etc.
5. Learn more about the rainforests by reading books and exchanging knowledge with others.
6. Join organizations or groups that the dedicated to the venture of saving rainforests:

"The Children's Rainforest"

P.O. Box 936

Lewiston, ME 04240

Through this group, children can buy and preserve parts of the Costa Rican Rainforest.

"Defender of Wildlife"

1244 24th St. NW

Washington, DC 20036

Interested in endangered species and wildlife legislation.

"World Wildlife Fund"

1250 24th St. NW

Washington, DC 20037

The WWF works internationally to protect endangered lands and wildlife.

4. "Adopt an Acre Program, The Nature Conservancy"

1815 N. Lynn St.

Arlington, VA 22209

Adopt a piece of the rainforest.

Classifications to Note

Insects

- No legs
- Two antennae
- Hear with antennae
- Smell with antennae

Mammal

- Body has hair
- Young feed on mother's milk

Amphibians

- Born in water
- Can live on land or water

Bird

- Body has feathers
- Forelimbs are wings

Reptile

- Body has scales
- Breathes air

Unit Extension Activities

1. Find pictures that fit these descriptions and see if they are rainforest animals.
2. Each child can make a scrapbook of animal pictures.
3. Practice making up cinquain poems about the animals.

In these poems:

- Line one: One word (title).
- Line two: Two words (describes line one).
- Line three: Three words (describing action for line one).
- Line four: Four words (a feeling about line one).
- Line five: One word (another word for line one).

Some examples:

Boas

Green brown

Swallows prey whole

Long body hard scales

Amphibian

(Find me on the forest floor)

Toucan

Eats fruit

Large long bill

Rhymes with "you can"

Bird

(Find me in the canopy layer)

Ant

Six legs

Grows very large

Important to food chain

Insect

(Find me on the forest floor)

4. Make a rainforest quilt

Need:

- 10-inch square pieces of various light shades of green colored cotton material (can use all white).
- colored markers.

Directions:

1. Have each child draw a picture of a favorite animal of the rainforest on her/his square. Use black marker for drawing and use the colors for filling in the picture.
2. Collect all the squares when finished and sew pieces together. Hem the edges for a finished look.
3. Hang the quilt on a bulletin board or wall and title: "Our rainforest animals."

5. Build a miniature rainforest.

Need:

- fish tank
- gravel
- charcoal
- compost
- exotic plants (ferns, orchids, etc.)

Directions:

1. Place a layer of gravel and charcoal at the bottom of the fish tank.
2. cover with an inch of rich compost and shape the ground with small stones under compost.
3. Dampen compost and add a variety of exotic plants.
4. Use glass top and keep in a warm, well lit spot out of the sun.

Ideas For Display Table And Room Decorations:

Table:

Will need some of these items for display table and helping to create the atmosphere:

1. Samples of woods (mahogany, teak, ebony and balsa) for small wooden projects (i.e.: airplane models).
2. Spices and fruits from home pantries.
3. Tropical plants such as previously listed.
4. Some medical supplies (try to find a periwinkle flower).
5. Ropes, yarns, pieces of rubber, charts and posters.
6. Appropriate cassettes (can be played during reading recreation time and for play). Some cassettes have been listed but others can be found in the music section of Target stores.

Decorate the table by covering with a green plastic table-cloth. Use real or artificial plants on the table. Can put little toy plush animals throughout the artificial tree leaves.

Room Decorations:

1. Use plastic or paper hanging vines and flowers made either by children's art work or from commercial decorating stores.
2. Buy poster of a parakeet or other bird hangings, balloons, etc.
3. Make a blow-up of drawn tree layers of the rainforest and put children's drawn insects and animals on the correct levels.

A place to call or write for rental of certain objects you might want to use is:
The Party Tree Rental and Retail Store
3425 Freedom Dr.
Parkway Pointe Shopping Center
Springfield, IL 62704
Phone: 217-7930-9462

Jungle Menus

JUNGLE PUNCH

- 1 banana
- 1 cup of orange juice
- 1 cup of pineapple juice
- 1 can of lemon-lime soda
- 1 pint of lemon sherbet

Puree ripe banana in a blender. Add the juices and blend. Just before serving, add lemon-lime soda and mix. Put a spoonful of lemon sherbet in each glass and fill with the punch (estimate if this recipe will be enough for the whole class).

TROPICAL TRAIL MIX

- 1 cup of cashew pieces
- 1 cup of peanuts
- 1 cup of broken dried banana chips
- 1 cup of chocolate chips
- 1 cup of dried pineapple chunks
- 1 half-cup of coconut flakes

Combine the ingredients in a large bowl. Makes about 2 pounds. Can also use Brazil nuts, dried papaya or macadamia nuts.

Rainforest Alphabet

(See if the children can tell something about each word.)

- A - Amazon River
- B - Buttress
- C - Canopy
- D - Dormant
- E - Epiphyte
- F - Fungi
- G - Gorilla
- H - Hummingbird
- I - Iguana
- J - Jaguar
- K - Knowledge of how to save the rainforest
- L - Lianas
- M - Mandrill
- N - Nutrients
- O - Orangutan
- P - Parakeet
- Q - Quartzite
- R - Rain
- S - Sloth
- T - Toucan
- U - Understory
- V - Vulture
- W - Waterfall
- X - Xylem
- Y - Yellow Rumped Cacique
- Z - Zest and Enthusiasm for learning about the rainforest!

(Children may want to write something about any of the words they know about.)

THE RAINFOREST TOUR

A 3 MINUTE PLAY BY FRIEDRICKA WHITE

CAST: Explorer-Will have on hard hat and carry a play rifle.

Pygmy - student who will carry bow and arrow
(ITU) and wooden spear or stick. Have towel draped around waist

So. American
Native - Will have on straight haired black wig
(AMORI) (optional), carry a farming tool and could have decorated designs on face.(optional).

Four Animals representing an Eagle, Sloth, Gorilla and Boa snake. (The animals can have costumes of your own ideas). They will present themselves using Cinquain poetry and must practice reciting in poetic style.

PROPS: Cassette tape of Rainforest sounds.
Room or hall decorated area for conducting play tour.
(See data sheet for ideas on decorating).

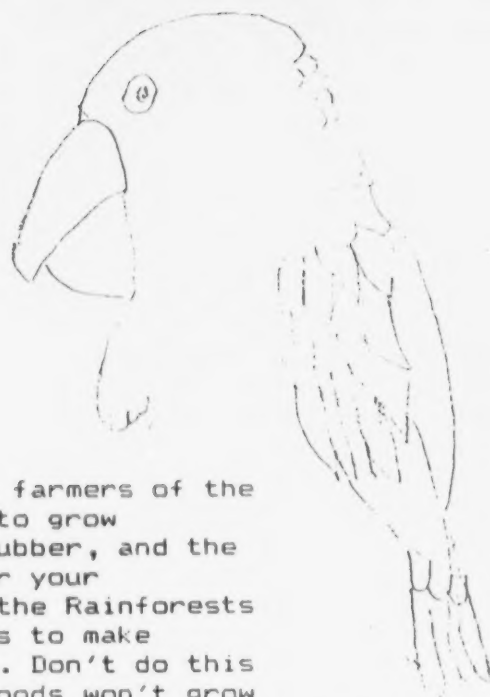
ITU: Welcome to the Rainforest. I will show you something about our world. Listen to the sounds you hear.(cassette tape is playing softly). They are are the sounds of the animals and insects. Let your imagination go wild. I am a hunter and my family group stays on the move. I live in Central Africa near Zaire. We like to be called the Forest People. Look at our beautiful trees. There are 4 levels in our forest. Let me introduce you to an inhabitant from the tallest tree called the EMERGENT layer.(Eagle pretends to fly out).

EAGLE
POWERFUL-MAJESTIC
FLY VERY FAST
KING OF TALLEST TREE
BIRD.

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EXPLORER: This is going to be a lot of fun. I'll try to learn something about your world but its awfully hot here. I

Antonio J.
Brown School



AMORI: Hi my name is Amori. I am one of the farmers of the Rainforest. I live in South America. We like to grow vegetables and fruits. We also help gather rubber, and the cut trees for the beautiful wood you like for your furniture. We can show you how to help save the Rainforests by burning down the trees and using the ashes to make fertile soil. This is called "slash and burn". Don't do this in one place more than 3 years because the foods won't grow any more. The ground will need 20 more years to recover. Look at our next level of trees. This animal you see is coming from the CANOPY layer. (Sloth comes out very very slowly) (says poem)

SLOTH
QUIET SLOW
HANGS UPSIDE DOWN
SLEEPY LAZY EASILY CAUGHT
MAMMAL

ITU: Hey Gorilla-- come on out of the UNDERSTORY. (Gorilla comes out on all fours walking and beats on chest) (says poem)

GORILLA
STRONG GENTLE
WALKS ON KNUCKLES
EATS FRUIT AND LEAVES
MAMMAL

AMORI: We'll call one more animal from the forest floor. (Snake slithers out and says poem).

BOA
GREEN BROWN
SWALLOW PREY WHOLE
LONG BODY, HARD SCALES
REPTILE.

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ITU AND AMORI TOGETHER: We hope you enjoyed your tour in our Rainforest.

EXPLORER: Yes, but I have to get out of here before I keel over from the heat. By the way- can I kill one of these beautiful animals to take home with me? I could stuff him and show him off

ITU: No, you will break the food chain that animals must keep in order to continue life. The animals must depend on each other for food and the plants need the nutrients when animals die and decay.

AMORI: And don't cut down our trees or capture our animals for furs, bags, shoes or any of those other goodies you want to show off. You might make some of our animals become extinct like the dinosaurs.

EXPLORER: Can I bring out my special bug spray right now and get me one of these mosquitoes that are biting the heck out of me right now. (has been slapping arms and legs during tour as if catching an insect).

ITU: Be careful of the plants and insects. They look beautiful but they could be dangerous.

AMORI: Yes- and one of these plants might have an ingredient that might save your life one day.

EXPLORER: Ok I'll let someone take care of the forests that knows what he is doing. Thank you for the tour. I'll tell everyone I see to HELP SAVE THE RAINFORESTS!

ENTIRE CAST: We'll all leave now so our friends can ask us questions. We are so glad you took a tour with us.

END

(Entire cast including animals line up and take a bow).



Allen Walker
Brown School

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BEST COPY AVAILABLE

Developing an Appreciation for Trees

Community Resource Curriculum Development Project

Developed and piloted by: Joyce Grey
Adapted to kindergarten level by: Denise Hetherington

Developing an Appreciation for Trees

Rationale

This unit is intended to meet the following Instructional Program objectives for the Illinois State Goals for learning at the Kindergarten level:

BIOLOGICAL PHYSICAL, ENVIRONMENTAL SCIENCES

Use appropriate scientific vocabulary.

Recognize science related careers and avocations.

Describe patterns in the environment and recognize the regularity of their appearance.

Identify similarities and differences in a set of objects or events.

Use simple measuring devices to measure solids and liquids.

SOCIAL STUDIES

Recognize contributions of diverse multicultural groups.

Recognize the need to control natural resources in our immediate environment.

MATHEMATICS

Count orally from 1-50.

Tell which activity takes more time and which takes less time.

Identify position or location of an object.

Content Background

This unit is an extension of the Chicago Public Schools Kindergarten Social Studies curriculum in which the city of Chicago is a major topic for students. Its name is based on the fact that the purpose of this unit is to develop a sense of appreciation and respect for trees in our environment.

Timeline for Unit

This unit is divided into three lessons. The lessons may be divided into 40-minute sessions with ongoing activities in the last two lessons. This unit is best planned in early summer or fall.

Evaluation/Assessment

Through observation, investigation and direct participation, students will experience our relationship with trees and actively participate in their preservation. Students will present short and long-term projects.

Community Resources

Chicago Academy of Sciences
2001 N. Clark Street
Chicago, IL 60614
312/549-0606

Chicago Botanic Gardens
Lake Cook Road at Edens Expressway
Glencoe, IL 60022
708/835-5440

Chicago Historical Society
1601 N. Clark Street
Chicago, IL 60614
312/642-4844

Morton Arboretum
Route 53 and I-88
Lisle, IL
708/719-2465

Chicago Park District
Ms. Kathy Shanasky
425 E. McFetridge Drive
Chicago, IL
312/294-2241

Lincoln Park Conservatory
Fullerton Ave. and Stockton Drive
Chicago, IL
312/294-4770

Garfield Park Conservatory
300 N. Central Park Boulevard
Chicago, IL
312/533-1281

Career Connections

The careers available in the study of plants and trees include the following:

NATURALIST: one who specializes in animals, plants, trees, and the ecosystems of nature

ARBORIST: tree doctor; one who specializes in the care of trees

NURSERY WORKER: a person who grows trees

LANDSCAPE ARCHITECT: one whose professional skill is the decorative and functional alteration and planting of grounds, especially at or around a building site or in city parks

LUMBERJACKS: one who fells trees and transports the timber to a mill

TREE TRIMMER: one who prunes and cuts trees

HORTICULTURIST: one who cultivates trees and plants

Glossary

BARK: the covering on the outside of the tree that protects it from heat or cold and from animals

BRANCH: a woody limb growing from the trunk of a tree

LEAF: one of the flat, green parts growing from a stem of a plant

ROOT: the part of a plant that grows down in the ground; roots hold the plant in the soil and take in water and minerals

SAP: a liquid that flows through a plant; sap carries water and food from one part of a plant to another

SEED: the part of a flowering plant from which a new plant will grow

SEEDLING: a baby tree

SOIL: the top part of the ground in which plants grow; earth; dirt

LESSON 1: Trees/Multicultural

Lesson Introduction

In this lesson, students will learn the importance of trees to different cultures.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. use simple measuring devices to measure solids and liquids.
3. identify similarities and differences in a set of objects or events.
4. recognize contributions of diverse multicultural groups.
5. identify position or location of an object.

Time Allotment

This lesson can be completed in four 40-minute sessions.

Materials

mangos
water
sugar
blender
knife
measuring cup and spoons
pot for steaming
shoe box lid
egg carton
tongue depressors or popsicle sticks
white paper
markers
glue
scissors
decorative pieces (buttons, feathers, leaves, beans, ribbons)

Advanced Preparation

Select literature on trees in various cultures. Prepare to focus on similarities and differences relative to significance characteristics. For example, a cola tree in West Africa has fruit that is eaten for many ceremonies: marriage, prayer, death, naming. The Ginko tree in China or Japan is used for medicine. The apple tree in America is used for food to eat. The baobab tree in Africa can live to be 1,000 years old and provides food and protection for wildlife and honey for the natives. Trees are appreciated for their beauty. They also provide protection from pollution in the air, cold, heat, and noise.

Procedure

Tap Prior Knowledge

1. Ask the students what they can tell you about trees in different countries. Allow students to identify and label pictures of trees given attributes. For example, "I live in America, have needle-shaped leaves and I'm decorated at Christmas. Do you know who I am?" Answer yes by swaying like a tree in the wind, answer no by standing straight and tall and not moving at all. (This activity is adapted from *The Circle Time Book*, by Liz and Dick Williams, Building Blocks Publication.)

Share with Neighbor

2. After group discussion on certain trees, divide into groups by cultures. For example, Americans, Africans, Indians. Each student will describe an attribute of a given tree from their culture. "I am a baobab tree, my branches are thick and curly." Challenge the other students to ask questions. For example: What color are your leaves? Where do you live? Do you have flowers or fruits.

Hands-on Activity

3. Schedule a community trip to the Chicago Botanic Garden, The Morton Arboretum, The Lincoln Park Conservatory or Garfield Park Conservatory. Highlight trees from different cultures, and their significance. Allow students to touch the trees leaves, barks, and branches. Point out other life around the tree, such as insects, birds, squirrels, or nests.

Introduce Principle/Concept

4. Compare and contrast physical characteristics of the trees. Compare and contrast usage of trees in different cultures. How are they used for food, shade, wildlife preservation, ceremonies, furniture, economics, medicine, or beauty? Remember the Ginko tree. Where is it from? What is it used for?

5. Show a picture or poster of a tree. Distribute construction paper. Have each student create an illustration of the tree and its use. Draw an apple tree and someone eating an apple, for example. Draw birds and their nests on a honeysuckle tree.

Relate Activity and Concept

6. Make an Eskimo laughing mask. "Long ago, wooden masks were made to make people laugh in the Laughing Contest. A serious group gathered in a large circle in the sing-song house, or ceremonial house, and the mask wearer acted like a clown and told jokes. The mask that made the audience laugh was the winner." (This excerpt taken from the Kids' Multicultural Art Book) Distribute Student Data Sheet 1.1 and complete the activity with the students.

7. Prepare a dish, using fruit from a tree. Have a question and answer period on the fruit and preparation of the dish. Use Student Data Sheet 1.2. Read a story about the tree and/or native land of the tree.

Home Activity/Parent Involvement

Invite parents to chaperone on the class trip. Invite parents to read a story to the class. Check reading resources for suggestions.

Lesson Assessment

Observe students looking at trees, doing art work. Note their oral participation and their performance during recipe task.

LESSON 2: Bringing Life to a Tree

Lesson Introduction

In this lesson, the students will plant several trees, care for these trees, and observe life brought to the trees.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. recognize science related careers and avocations.
3. describe patterns in the environment and recognize the regularity of their appearance.
4. recognize similarities and differences in a set of objects or events.
5. recognize the need to control natural resources in our immediate environment.
6. tell which activity takes more time and which takes less time.
7. count orally from 1-50.
8. identify position or location of an object.

Time Allotment

This lesson can be completed in four 40-minute sessions.

Materials

1-3 container trees (oak, honeysuckle, crab apple)
spade
shovel
water
mulch
soil
bird house
five portfolios

Advanced Preparation

Select trees that will attract birds, animals, and insects. Make sure that the trees selected are compatible to the soil of the area. Check with a nursery, the Chicago Botanic Garden, the Conservatories, etc. Select trees discussed in the previous lesson. Involve students in the selection process. Arrange students in cooperative groups.

Procedure

Tap Prior Knowledge

1. Review the discussion of trees from the previous lesson.

Share with Neighbor

2. Discuss materials, procedures, and occupations. Afterwards, allow each student an opportunity to label a material or procedure or describe an occupation involved in planting a tree.

Hands-on Activity

3. Plant the trees. Follow all planting directions.

Introduce Principle/Concept

4. Reiterate purpose of planting the trees. They are for beautification and they affect the climate, attract wildlife, and let us learn to care for living things.

Relate Activity and Concept

5. Students will draw pictures about their experiences while planting the trees. They will tell the location of trees in relationship to one another and count the leaves at initial and succeeding examinations. Students will tell which step of the planting took the longest.

Home Activity/Parent Involvement

Invite parents to assist with planting the trees. Provide each child with a seedling to plant at their home. Distribute literature on planting instructions and benefits of a plant in the home.

Lesson Assessment

Each student will describe planting, care and benefits of trees. Each student will participate in a regularly scheduled observations of the trees. Discuss any changes in growth, additions, or positions of the trees. Measure distance by counting the number of steps between the trees,

LESSON 3: Advocates for Trees

Lesson Introduction

Now that the students have been exposed to the different benefits and significance of trees in our environment and they have assumed responsibility for their care, it is time to involve significant others so the care and protection will last beyond this unit of study.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. recognize science related careers and avocations.
3. recognize the need to control natural resources in our immediate environment.

Time Allotment

This lesson can be completed in three 40-minute sessions.

Materials

fliers, pamphlets, bulletins from tree organizations
construction paper
snapshots
branches or sticks to carry posters

Advanced Preparation

Gather information from government forestry departments, tree advocates, private and volunteer organizations. Check resource list provided.

Procedure

Tap Prior Knowledge

1. Ask students how they feel about the trees, and how they think others in the community feel about the trees.

Share with Neighbor

2. Allow students to brainstorm to generate a list of ways they have mistreated or witnessed mistreatment of trees. Afterwards, tell what they plan to do differently.

Hands-on Activity

3. Locate an available wall area at the school, preferable where traffic is high, to develop a "Why trees are Important" display. Use brown paper, cut into trunk and branches. Mount on the wall, post informative materials on it and simple snapshots of games under a tree, picnics, a model ship, resting in the shade, forests, wildlife, etc. (This activity was taken from a pamphlet from the American Forest Institute.)

Introduce Principle/Concept

4. Initiate a discussion on things trees have to battle in the city. Focus on:
- a) soil compacting with parked cars, bicycles, and foot traffic over the roots. the soil gets compacted and makes it difficult for air and water to get to roots and feed the trees.
 - b) bark damage: trees suffer from damage to roots by lawn mowers, bicycles, ropes, and people. The bark protects the inner layers of the tree which transports water and nutrients from the roots to the leaves. If the inner layers are exposed the tree won't survive.
 - c) lack of water: Trees, just like any other living thing, need water. Rain water is not always channeled to the tree due to the sidewalk or sewers. (Excerpts taken from an article *Support Your Local Tree* by Suzanne Malec, manager of Neighbor Woods OpenLand Project.)

Relate Activity and Concept

5. Ask students to design statements or slogans. For example: Don't lean your bicycle across my bark, Please don't walk on my roots, I need water just like you. Copies of these slogans could be distributed around the school.

Home Activity/Parent Involvement

Arrange with your school PTA to have a "learn to love trees" program for one meeting. Have students pass out fliers of their slogans or carry signs. Show movies or slides you may have taken during the unit.

Lesson Assessment

Review participation in discussions, bulletin snapshots and slogans.

Student Data Sheet Masters

Developing an Appreciation for Trees
Student Data Sheet Master 1.2

Mango: a tropical evergreen tree, native to Asia, cultivated for its edible fruit.

Mango Snow

Ingredients

mango 8
sugar 3 tbs.
water 1 cup

Utensils

glass
blender
knife
measuring spoons
measuring cups
steamer

Set one mango aside for tasting and examination. Peel and slice 6 mangoes. place in the steamer for 20-25 minutes or until tender. Remove mango from steamer. Place mango, sugar and water in the blender. Blend until creamy and smooth. Allow to cool for a few minutes, or chill. Serve in small cups.

Developing an Appreciation for Trees
Student Data Sheet Master 1.1

Eskimo Laughing Mask

* from *Kids' Multicultural Art Book* by Alexandria M. Terzian

materials

plain shoe box lid, any size

egg carton, 3 sections

wooden tongue depressors or popsicle sticks

scrap white paper

feathers and other decorative odds and ends

markers

glue

scissors

what to do

1. The egg carton sections can be used as eyes and a nose by gluing them to the shoe box lid. Color the centers with the marker.
2. To make the eyes holes, cut two triangles under the egg carton eyes.
3. Cut a mouth shape and teeth out of the scrap paper. Color the mouth a dark color and glue on the shoe box lid. Cut teeth out and glue on the lid.
4. Using a marker, color the ends of the tongue depressors or popsicle sticks to look like hands. Glue them on each side of the forehead and cheek mask. Color another tongue depressor, and glue on the chin of the mask.
5. Glue feathers and other odds and ends to your mask for decoration and humor.

Please Return

Community Resource Curriculum Development

Evaluation Form

Name _____ School _____

Address _____

City _____ State _____ Zip _____

Grade level(s) taught: _____

Subject area(s) taught: _____

Which unit/lesson(s) did you teach?

Describe the overall effectiveness of the activities:

Were the materials lists complete?

Did the lessons fulfill the stated objectives?

Were the directions/steps clear?

Were the Student Data Sheet Masters helpful for your students?

What activities did the students enjoy most? Least?

What suggestions do you have for the revision of the CRCDP curriculum?

Thank you for your help in evaluating our curriculum. We are planning to revise the materials for distribution to other teachers so your input is extremely valuable to us. Please return your evaluation to:

Community Resource Curriculum Development Project
The Chicago Academy of Sciences
2060 North Clark Street
Chicago, IL 60614